FOUNDRY
EST. 1902 TRADE JOURNAL
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Offices: John Adam House, John Adam St., London, W.C.2
Single Copy, 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

JACKMAN-BUILT OSBORN JET CORE AUTOMATIC CORE BLOWER

For RAPID ECONOMIC PRODUCTION WITH ANY SAND

IN WOOD OR IN METAL BOXES

- PUSH BUTTON OPERATION
- HIGH SPEED CYCLE
- JET BLOW ACTION
- QUICK CHANGE BLOW HEAD AND BLOW PLATES
- STATIONARY RESERVOIR
- VENTED DOUBLE BLOW PLATE FOR WOODEN BOXES
- TABLE HEIGHT RAPIDLY SET AND LOCKED HYDRAULICALLY

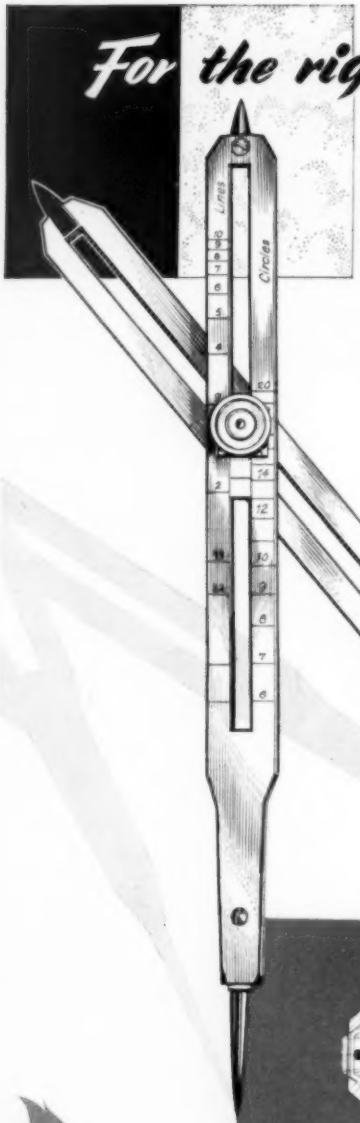
MACHINE No.	APPROXIMATE CAPACITY OF CORE	CLAMP CYLINDER DIA.
910	25 lbs.	10 "
916	75 lbs.	16 "
924	175 lbs.	24 "

J. W. JACKMAN & CO. LTD.

VULCAN WORKS · BLACKFRIARS ROAD · MANCHESTER 3

Telephone: DEANSGATE 4648 (three lines) · *Telegrams*: BLAST, MANCHESTER

For the right proportions...



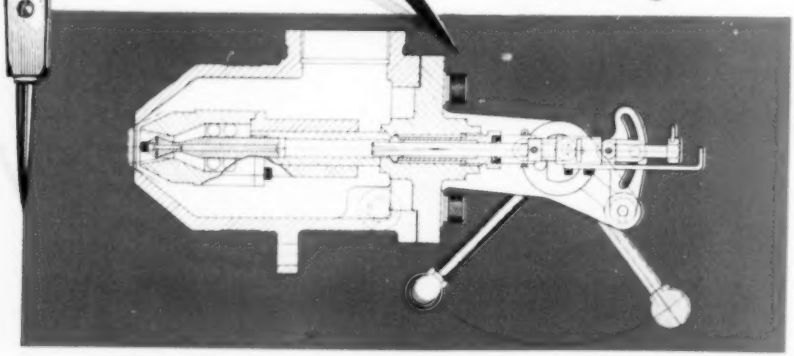
Schieldrop

SELF-PROPORTIONING OIL BURNERS FOR CONSTANT AIR-OIL RATIO

Pioneered by Schieldrop in Great Britain, self-proportioning oil burners offer outstanding advantages including peak efficiency and real economy of operation. Write for full details of Schieldrop burners.

Note these features—

1. Single lever control.
2. Easy adjustment for high and low flame settings.
3. Simple and robust construction.
4. Constant velocities of both primary and secondary atomising air, giving uniform flame over a 5-1 turn-down range.



Schieldrop & COMPANY LIMITED

STOTFOLD, BEDS. Phone 414 (4 lines)

The basic source of precision casting

The *prepared* foundation for a casting job—large or small—is the vital contribution to the highest degree of accuracy. Spermolin Core Oils and Binders minimise fluctuations in processing and effect economy in production costs—*and*—no waste castings. Spermolin gets to the core of technical efficiency!

Adjacent we illustrate mould and cores for the 60-ton planing machine shown below—a fine example of the results of using the highest quality core oils and creams famed as Spermolin.

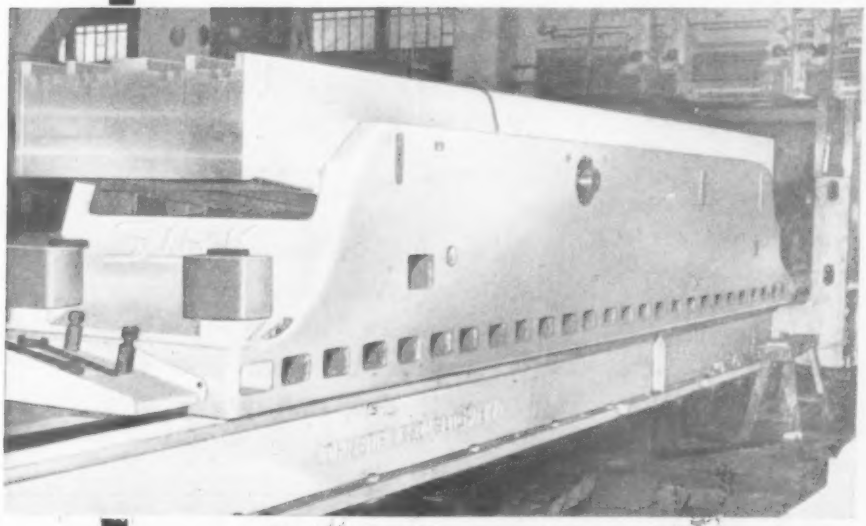


Photo by courtesy of Messrs. John Stirk & Sons Ltd., Halifax

Spermolin
(REGISTERED TRADE MARK)

the secret of good casting

Established over half a century.

2 UNION STREET SOUTH · HALIFAX

A

BERKOAL keeps sand in good mouldable condition.

BERK B CHEMICALS

Ask Berk

for

BERKOAL

for foundry sands.

2%-3% BERKOAL increases green strength. Stops scabbing and expansion troubles. Reduces Coal dust.

YOU CAN TRY BERKOAL FOR NOTHING.

Just let us know how much you require to make a practical test and we will despatch gratis.

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Telephone: HUNter 6688

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BELFAST SWANSEA

To F. W. BERK & Co., Ltd., P. O. Box 500,
Berk House, 8, Baker Street, London, W.1

Please send me ☐ . . . lbs. Berkoal and information leaflet.

M .....

.....

.....

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

"Heaven help us if we carried on that sort of caper at AW. Customers don't want firms that are up one minute and down the next. When buyers come to a company with our reputation they expect—and get—a reliable performance. Fancy telling them that a load of pig wasn't up to specification because one of our furnacemen was off form!

"I reckon I'd get a coupon up every week if footballers were only half as consistent as the AW team."

REFINED PIG IRON

'Supplied to any specification at short notice'

ARMSTRONG WHITWORTH (METAL INDUSTRIES) LIMITED

Close Works · Gateshead Upon Tyne 8 · Telephone: Gateshead 71261

Steel Foundry: Western Road Works · Jarrow · Co. Durham.

A2

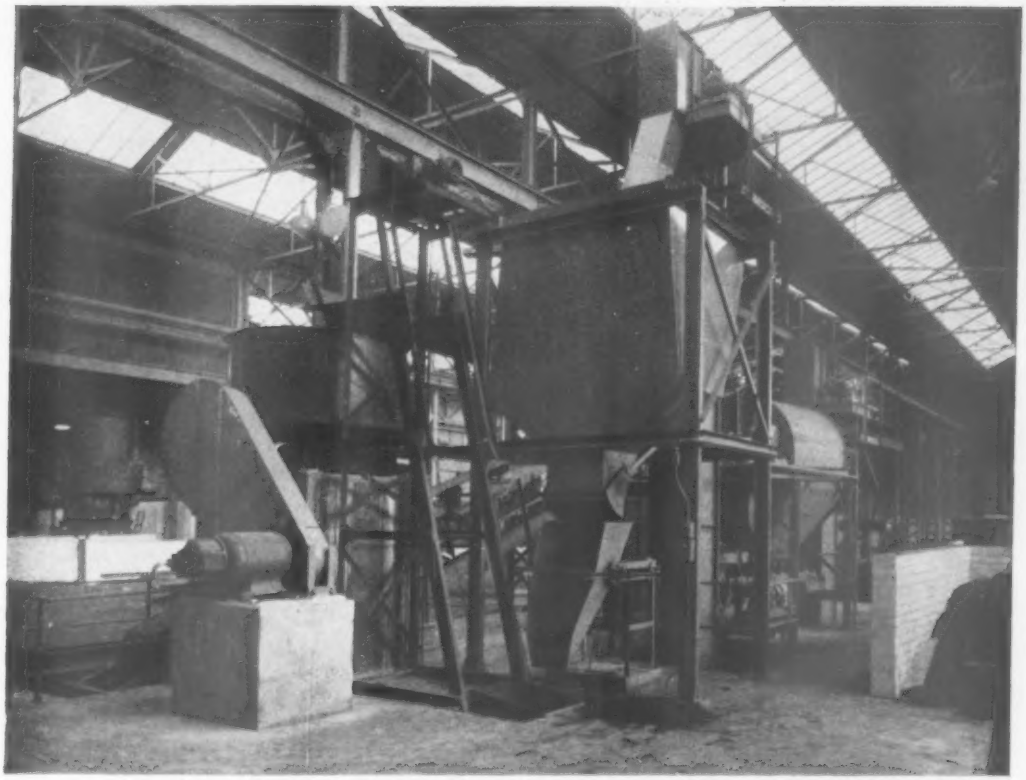
Whatever their HORSE power, engines purr like PUSSIES when their castings have been cored with Sternocore sand binders—they will go on doing this for DONKEY'S years. Sternocore products* can be equally trusted to give the same harmonious results till the COWS come home!

* *We won't bother you with the technical "gen" here, but just say the word and we will have a representative round with the milk in the morning.*

STERNOL Oils

PLEASE HELP SPASTICS

STERNOL LTD., ROYAL LONDON HOUSE
FINSBURY SQUARE, LONDON E.C.2. Telephone: MONarch 3871-5



This Pneulec plant provides all facilities from knockout through sand cleaning and mixing to delivery over moulding units. We build similar plants in all capacities.

Built in England by

PNEULEC LIMITED, SMETHWICK, Nr. BIRMINGHAM

Illustration (reproduced by courtesy of Messrs. BILSTON FOUNDRIES Ltd.) is similar to the one described below

A Roper INSTALLATION will reduce your labour force

One man operation—resulting in real economy of labour and real efficiency too because the human element is reduced to a single degree. With Roper Automatic Charging Cycle Installation the Crane Operator does more than operate a Crane . . . by push-button he makes up the Metallics Charge in Weigh Hopper, controls the sequence of delivering the complete charge via Drop Bottom Bucket Charger into Cupolas in a 17 ton per hour capacity furnace, and can control the Coke and Stone feed to Weigh Hopper and record Charge weights.

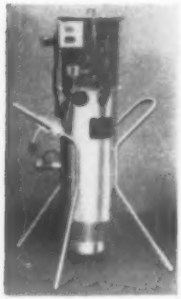
The Roper Automatic Charging Cycle Installation can also incorporate other modern features such as Slag Granulation, Wet Arresters, Water Cooled Melting Zones, etc., etc.

Operation **Roper** *is operation of economy and efficiency*

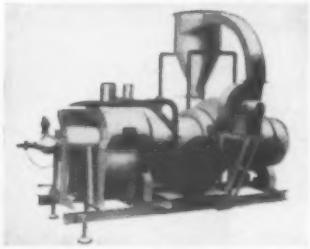
E. A. ROPER & CO. LTD.

FOUNDRY EQUIPMENT ENGINEERS, KEIGHLEY, YORKSHIRE

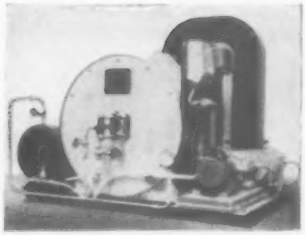
Tel. : Keighley 4215/6 *Grams : "Climax" Keighley*



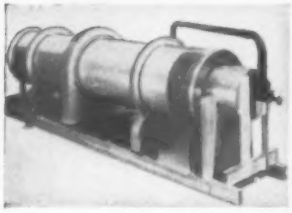
Axial Jet-M Hot Air Unit



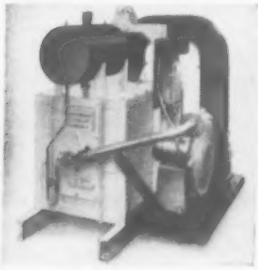
Sand Dryer and Cooler



Portable Oil Fired Mould Dryer



Sand Dryer, 1-10 tons per hr.

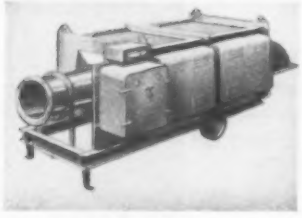


Oil Fired Mould Dryer

Vertical Core Stoves

Ladle Dryer

Ingot Mould Stoves



Electric Mould Dryer

Horizontal Core Stoves

Designed by
BRITISH ENGINEERS
for
BRITISH INDUSTRY

This equipment has been designed to meet the requirements of modern foundry practice and is completely reliable, efficient and economical.

MODERN FURNACES and STOVES LIMITED

Builders of
INDUSTRIAL FURNACES

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COMMONWEALTH AGENTS

Forest Engineering (Pty.) Ltd.,
P.O. Box 6738,
Johannesburg, South Africa

The large economy size

Where replicas of large master patterns are required, Araldite casting resins provide exact duplicates in a very short time and at much lower cost for labour. Epoxy resins give extremely accurate reproduction of a mould surface. Setting takes place at room temperature, and there is no shrinkage, so that the operation of making a double-contraction pattern can be saved. For these large patterns, Araldite casting resin is used in conjunction with glass cloth laminates to give stability and flexural strength, and followed by a suitable filler. Patterns cast in Araldite are tough and not easily damaged. They need little care in storage, and are resistant to damp and chemical attack, so that they can be used for work employing the CO_2 process. Alterations are easily carried out when required, by using a paste of Araldite resin and hardener, with filler.

Replica of master pattern, 6 ft long, for a diagonal brace of a Caterpillar D8 Tractor. Cast in Araldite by Wilkinson & Co. Ltd, Bilston, for F. H. Lloyd & Co. Ltd, Wednesbury, suppliers of castings to Caterpillar Tractor Co. Ltd, Glasgow.

Araldite *epoxy resins*

Araldite is a registered trade name

CIBA (A.R.L.) LIMITED *Duxford, Cambridge. Telephone: Sawston 2121*

FOCUS ON 'FULBOND' Nº 9

FULBOND
in organically bonded core sands

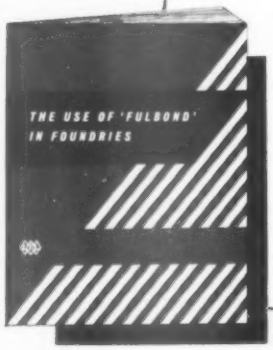
FULBOND will not replace the organic binders normally used in core sand mixes, but is very useful for increasing green strength and maintaining dimensional stability before baking.

A small addition of FULBOND is equivalent to a much greater quantity of natural sand for increasing green strength and has the advantage of not reducing permeability. It is also a much cheaper method of imparting green strength than by increasing the organic binders.

FULBOND is used extensively in the preparation of steel foundry core sands, where a high green strength is essential for some of the large hand rammed cores. The emulsifying effect of FULBOND in oil and cereal bonded cores promotes adhesion of the sand to core irons during ramming up.

FULBOND also improves the deformation properties of the sand at elevated temperatures and helps to prevent contraction cracks during solidification of the castings.

Either grade of FULBOND can be used for core sands depending on the tensile and transverse properties required. The physical characteristics of the base sand and the type of organic binders help to determine which grade should be used.



For a copy of this Brochure please write to:-

THE FULLERS' EARTH UNION LIMITED

Patteson Court, Nutfield Road, Redhill, Surrey

A member of the Laporte Group of Companies

CMF64

Fifteenth century stone carving of a sow and litter in St. Cuthbert's Church, Wells. Photograph by Ruth Meyler & F.C. Sillar

50 MILLION PIGS GO TO MARKET!

In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when iron from Blast Furnaces was directed into long troughs and from there into short and narrow troughs placed at right angles, a resemblance to sows suckling their appendaged litter led to the description of 'pig iron'.

This series of advertisements illustrates some of the 'ecclesiastical' pigs and emphasises the 50,000,000 'special' pigs which Warner and Company have supplied to Iron Foundries producing High Duty Castings.

WARNER WARNER WARNER

"Pioneers of *Refined Pigiron"*

KA

WARNER & CO. LTD., MIDDLESBROUGH

FOXBORO

Foundry Instrumentation

Weigh all the air

THE FOXBORO AIR WEIGHT CONTROL SYSTEM is specially developed to provide the Foundry Industry with Uniform Cupola Control. This completely Automatic System controls the weight of Air delivered to the Cupola, reduces fuel consumption and makes possible :—

UNIFORM HEATING
BETTER POURING
HIGHER QUALITY CASTINGS

In addition, Foxboro Systems are available for measuring, recording or controlling — Pressure, Humidity, Dewpoint, Temperature and many other variables.

FOXBORO-YOXALL LIMITED

REDHILL • SURREY • ENGLAND

d u r a b i l i t y

Solid ribbed hot-rolled steel sections re-inforced externally enable these boxes to resist the roughest usage for the maximum period . . . prolonged if a Shakeout Machine is used.

Sterling

STERLING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

Cogent
605

Hallsworth Plant doubles casting output at Heeley & Peart..

"With your Hallsworth Plant we have doubled production per square foot of floor space and our operators' productivity is now 2½ times as great, with less skill required."

This paragraph from the letter we reproduce shows the phenomenal increase in casting production achieved by the installation of the Hallsworth Automatic Moulding system.

In addition to this exceptional increase in output and productivity per operator, the vertical system of pouring and clamping enables increased casting yields to be obtained. Special care has been taken at all stages of the plant's design to ensure consistent production of high quality castings.

Rubery Owen Foundry Equipment Division offer a complete advisory service on the building and equipping of the modern foundry, incorporating the Hallsworth Automatic Moulding system and general products of the organisation.

MANUFACTURED BY

HEELEY & PEART LIMITED

MALLEABLE IRON FOUNDERS

TELEGRAMS: MOONRAIL, NEWPORT, MON. — Somerton Works, Newport, Mon. — TELEPHONE: NEWPORT 71684/5

7th December, 1960.

A. G. B. Owen Esq., C.B.E.,
Chairman,
Messrs. Rubery, Owen & Co. Ltd.,
P.O. Box 10,
Darlaston,
Staffs.

Dear Mr. Owen,

In this, our Jubilee Year, I feel I must write to say that the recent installation of your Hallsworth Automatic Moulding Plant is one of the best investments we have ever made.

With your Hallsworth plant we have doubled production per square foot of floor space, and our operators' productivity is now 2½ times as great, with less skill required.

As you know, we have ordered a second Hallsworth, and we estimate that with only 30% more floor space we shall produce approximately 3 times as much as before.

We are most pleased with the Hallsworth plant, and with the very efficient service given by your Foundry Equipment Division.

Heeley & Peart Ltd Newport Foundry Jubilee YEAR 1910—1960 Originally Founded in Birmingham over 100 years ago

Yours sincerely,

Director.

HEELEY & PEART LIMITED.

LONDON & HOME COUNTIES: MESSRS. MARTIN & FRAMPTON, 10 BUCKINGHAM PALACE GARDENS, LONDON, S.W.1. TEL. NO. SLOANE 8811/2/3.

MIDLANDS: MR. H. L. GLOVER, 20, LINTHURST NEWTOWN, BLACKWELL, NR. BROMSGROVE, WORCS. TEL. NO. BILLESLEY 1900.

NORTH WEST: MR. A. TOMLINSON, 27, BRAZENNOSE STREET, MANCHESTER, 2. TEL. NO. - BLACKFRIARS 4720.

SCOTLAND: MR. W. HAMILTON FRAME, 38, WEST CAMPBELL STREET, GLASGOW, C.2. TEL. NO. CENTRAL 1414.

RUBERY OWEN & CO. LTD.

(FOUNDRY EQUIPMENT DIVISION)

EMPRESS WORKS, WALSALL ROAD, WILLENHALL, S. STAFFS. · Telephone: Willenhall 737

FOR INCREASED PRODUCTIVITY
IN THE FOUNDRY –

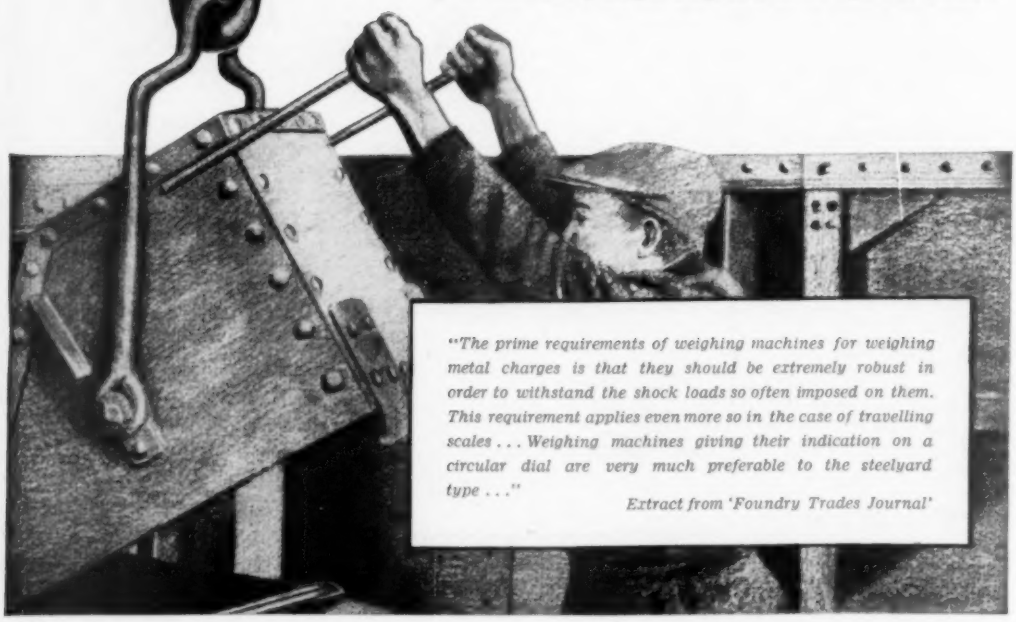
Weigh as you charge

WITH THE

SALTER

No. 99 CRANE WEIGHER

When it's a big, tough weighing job such as weighing metal charges, the Salter '99' saves time and labour and speeds production. Accurate weight at a glance. Listed in capacities from ½ to 100 tons, larger capacities to special order.



"The prime requirements of weighing machines for weighing metal charges is that they should be extremely robust in order to withstand the shock loads so often imposed on them. This requirement applies even more so in the case of travelling scales . . . Weighing machines giving their indication on a circular dial are very much preferable to the steelyard type . . ."

Extract from 'Foundry Trades Journal'

GEO. SALTER & CO. LTD., WEST BROMWICH

H-W.421

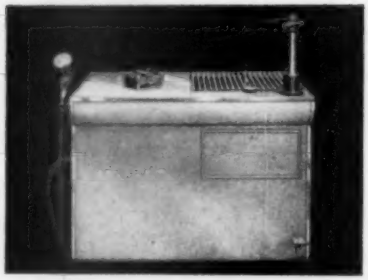
Come and see it in operation at the Battersea
Test Foundry, or ask our Technical Representative to call.

The Crucible Department THE MORGAN CRUCIBLE COMPANY LIMITED, NORTON WORKS, WOODBURY LANE, NORTON, WORCESTER.
Tel: Worcester 26691. Telegrams: Crucible, Worcester.

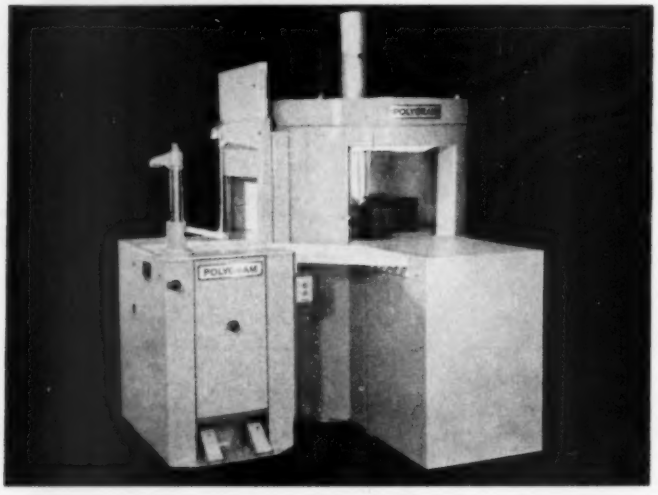
752A

GOOD FOR 1947

SHELL COREMAKING BY POLYGRAM



BETTER FOR 1954!!



BEST FOR THE 1960's!!!

First of the new and extended range of Polygram Shell Moulding and Coremaking Machines, the CMU Coremaking Unit is BEST FOR YOU because of these eight features

Maximum Versatility	Maximum Complexity-of-core
Minimum Handling	Minimum Floor-space
Maximum Quality	Maximum Production
Minimum Skill	Minimum Heat

If you are a **jobbing** *foundry, write now for details to:-*

Polygram *Casting Company Limited*

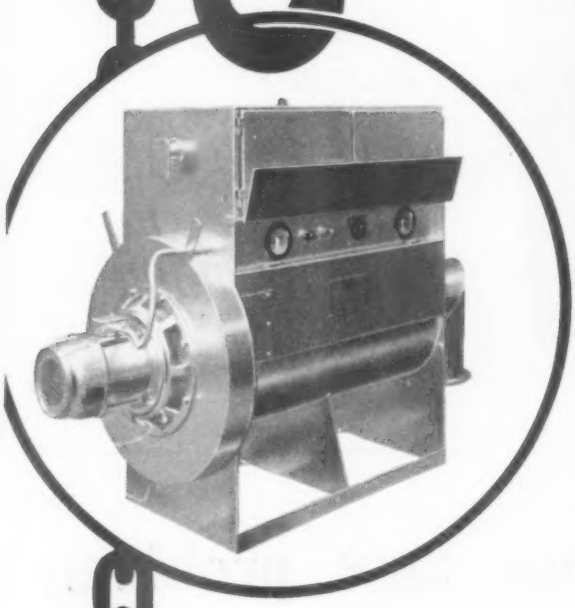
THE FIRST NAME IN SHELL MOULDING

SHERNFOLD PARK, FRANT, TUNBRIDGE WELLS, KENT, ENGLAND.
TEL. FRANT 346

Even if you are not a jobbing foundry, write just the same—for details of our shell coremakers which will keep up with the most highly mechanised line.

BROWN BOVERI

PORTABLE ELECTRIC MOULD DRIERS



. . . designed for drying floor moulds or large box moulds for ferrous and non-ferrous metal castings. They operate by forcing hot air over the mould surface and through the sand giving quicker and more efficient drying than is normally achieved by other methods. Using air temperatures lower than hot gases, and less than one third the quantity of heat, they reduce drying times by half. Heating is uniform throughout the mould and despite rapid drying, surfaces remain free from cracks and cleaner castings are produced.

* Driers need no attention during operation.
* Power input is regulated automatically.
* Working conditions are improved by elimination of smoke and burning gases.

MANUFACTURED UNDER LICENCE BY:—

FAME

FOUNDRY & METALLURGICAL EQUIPMENT CO. LTD.

NETHERBY · QUEENS ROAD · WEYBRIDGE · SURREY

Associated with Efco Ltd. and Stein & Atkinson Ltd.

Weybridge 3891

NGD/B/4/38

'T' Type exhaust and collecting units are available ex-stock

To settle your dust problem

Apply 'T' type units to your grinders, polishers or other dust creating machines and at once you'll see the difference. You solve your dust problem immediately. 'T' type units are completely self-contained, portable and space saving. They embody a highly efficient motor driven fan which sucks in dust laden air through filters to discharge it, clean, from an outlet at the top of the unit.

Operation is simple. With suction pipe fitted and electric supply connected, the unit is ready for work. Cleaning the filters and emptying the dust tray takes only a few minutes.

If you want to know more about 'T' type units publication No. 16/25 gives full details. Write now.

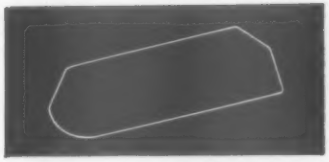
KEITH BLACKMAN LTD *Fan Makers since 1883*

MILL MEAD ROAD · LONDON · N.17

TA93-47/670

On your metal . . .

in



by

Park and Paterson Ltd.

INGOT MANUFACTURERS

The explorer . . . . the hunter, would never make anything of his endeavours unless he were at concert pitch a greater part of the time. Concert pitch is just how we would describe the tune of our organisation.

MANCHESTER
MARPLE, STOCKPORT, CHESHIRE. *Tel.:* MARPLE 1422-3

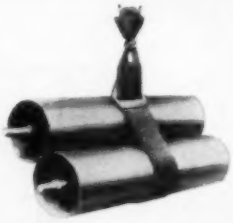
GLASGOW
PARKHEAD, GLASGOW E.1. *Tel.:* BRIDGETON 4451-2

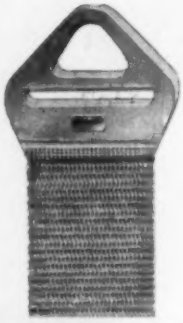
FELCO
LIFTING APPLIANCES

TRIPLE GEAR CHAIN BLOCKS

SHORT HEADROOM. Light weight. Compact and highly efficient. Capacities from 1 ton to 20 tons.

'WEDCO' WIRE BELT SLINGS





THE SLING WITH 1,000 USES

The " Wedco " wire Belt Sling has the strength of steel combined with maximum flexibility and a wide bearing surface giving exceptional load stability.
Made from thousands of strands of sturdy woven wire in a smooth transverse loop construction " Wedco " Wire Belt Slings cannot snap or tear. They are safer, easier to handle, faster to rig and will not whip, kink or tangle.
In the field of mechanical handling this is something you should know more about, write us for the fullest details.

RATCHET HOISTS

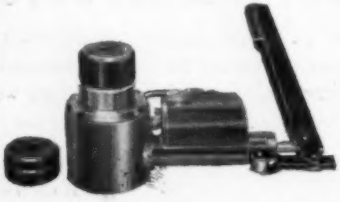
Incorporating a patented Overload Preventer giving greater security and safety to the operator, also reducing wear and saving cost of maintenance. A free - wheeling feature enables quick adjustment of unloaded chains.

BABY 60 ELECTRIC HOIST BLOCKS

BRITISH MADE. Patents Pending. 5 and 10 cwt. capacity. Light weight, compact and portable. Pushbutton control. Upper and lower overtravel limit switches. Supplies for any height of lift to suit requirements. Top hook suspension facilities attachment to travelling trolleys or girder clamps, etc.

HYDRAULIC LOW LIFT JACKS

Large capacity for use in confined spaces. Swaying under load eliminated by large diameter providing easy adjustment of height. Capacities from 10 to 30 tons.



TRAVELLING CHAIN BLOCKS

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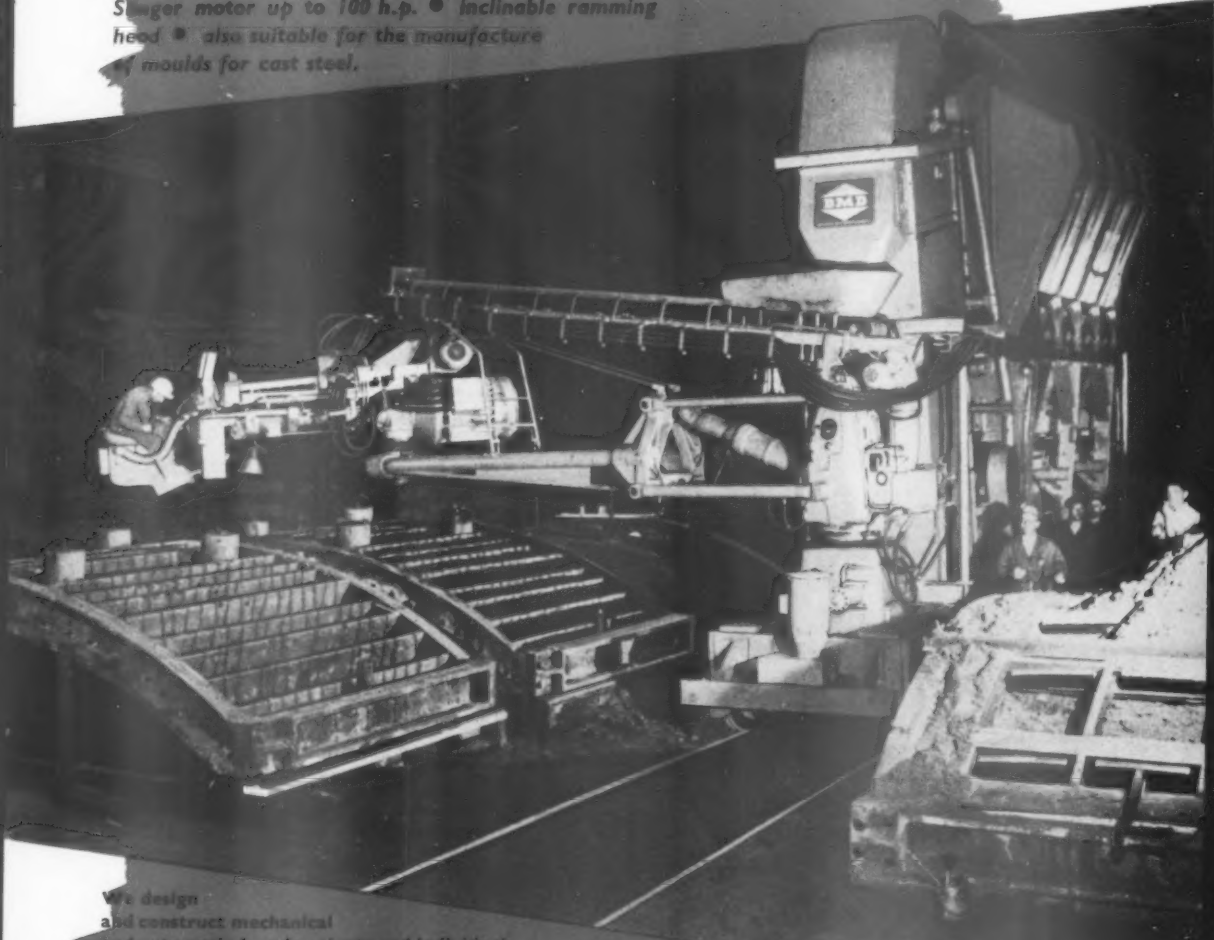

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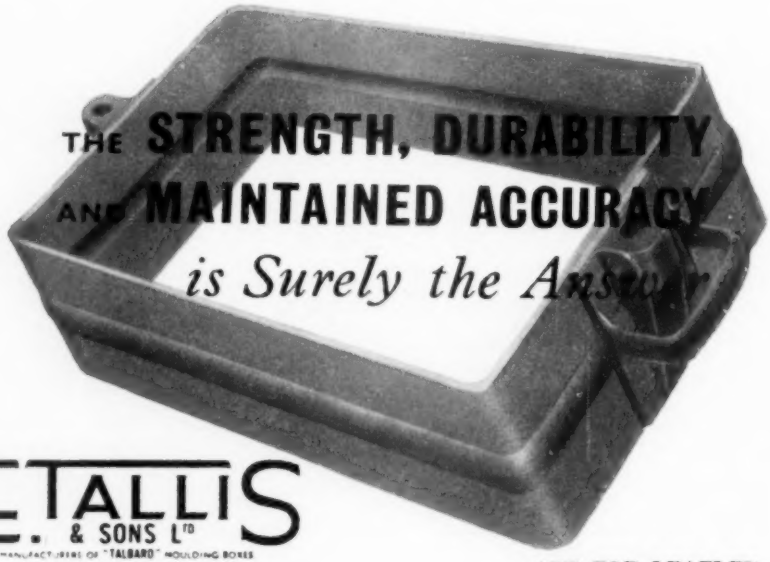

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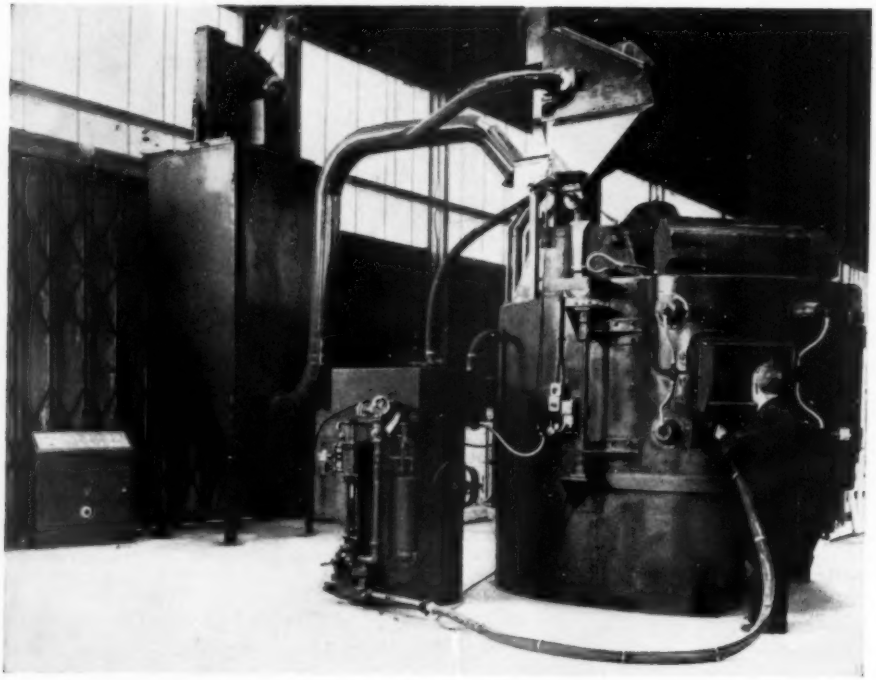

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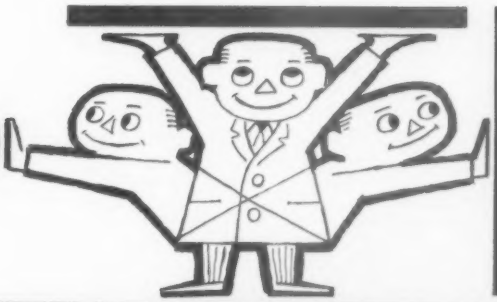
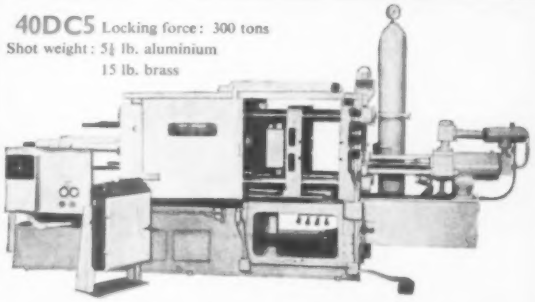
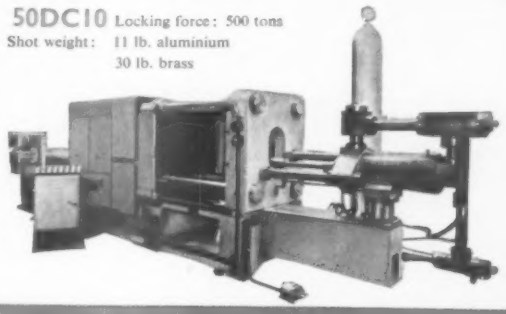


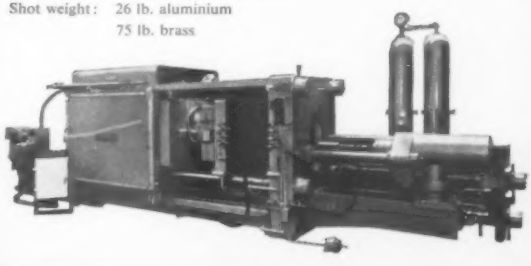
40DC5 Locking force: 300 tons
Shot weight: 5½ lb. aluminium
15 lb. brass



50DC10 Locking force: 500 tons
Shot weight: 11 lb. aluminium
30 lb. brass



60DC20 Locking force: 750 tons
Shot weight: 26 lb. aluminium
75 lb. brass



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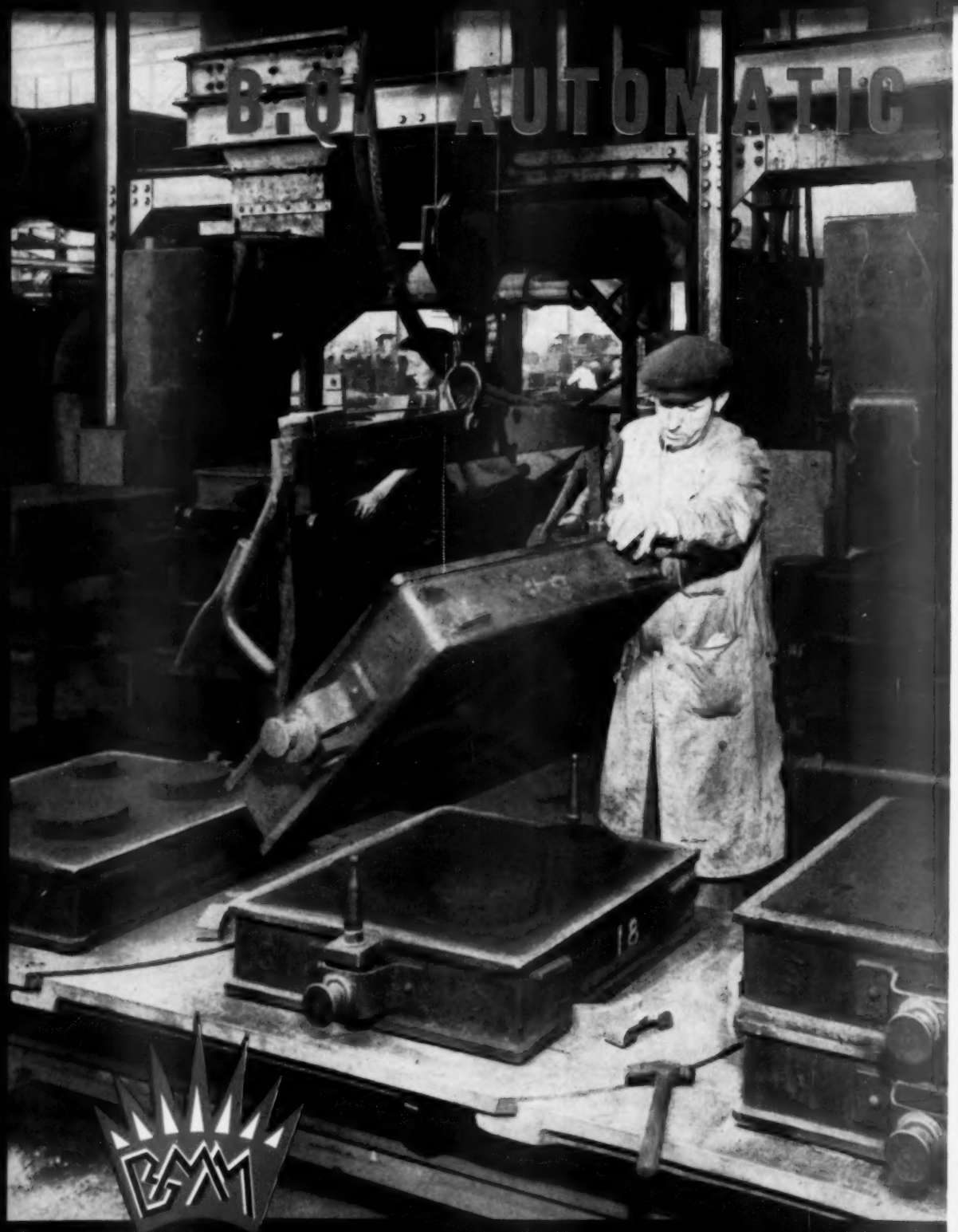

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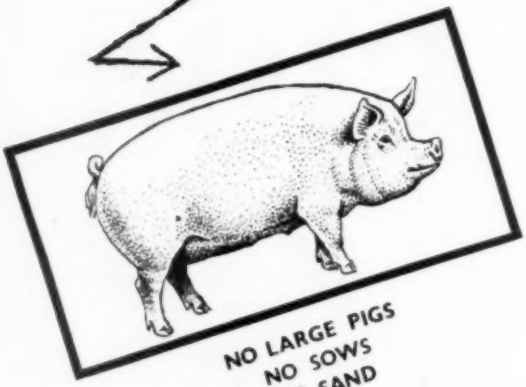

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Vol. 110 March 2, 1961 No. 2308

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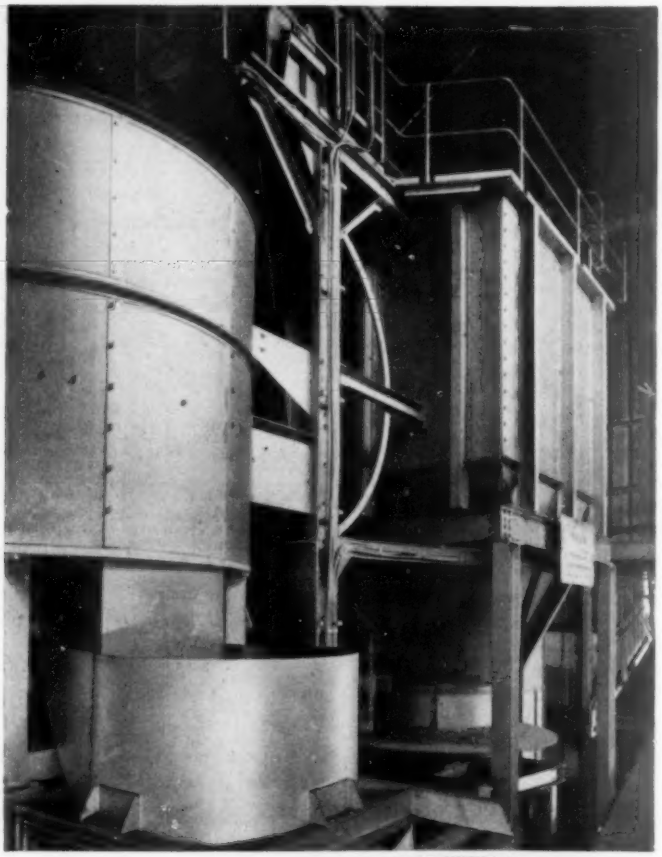

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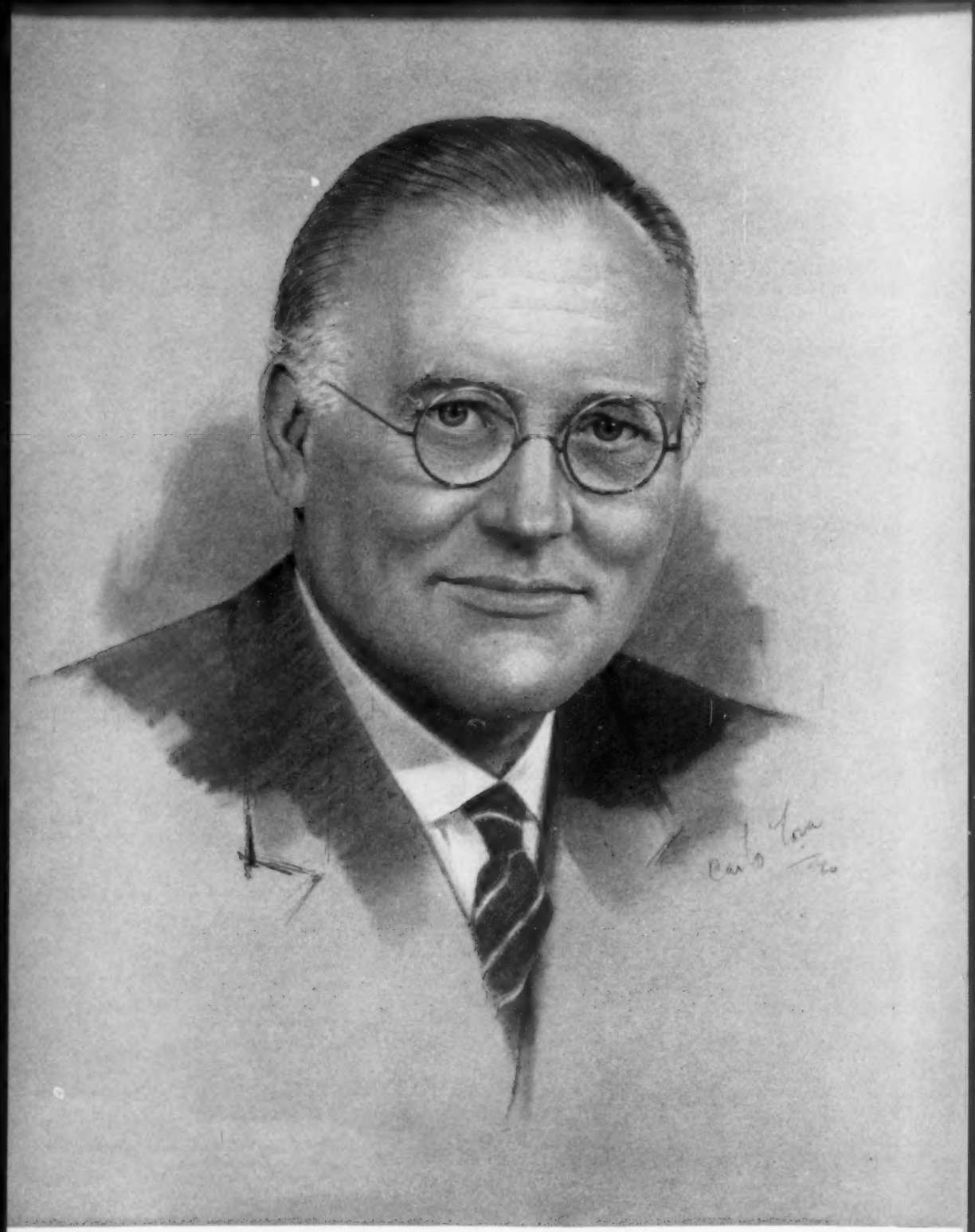
Future for Castings

Our American contemporary *Foundry* has conducted a survey on the future use of castings by sending questionnaires to 4,796 chief design engineers operating within 20 industries. Replies were received from 1,030, representing users of about half-a-million tons of castings of all sorts. The outcome is that after five years an increase in America of 22 per cent. is expected in the overall consumption of castings. For ductile iron, a growth of 67 per cent. is forecast, with aluminium at 27 per cent., second, and zinc-base castings running third at 23 per cent. These expansions were attributed mainly to normal economic growth, but views were expressed that there would be some gains due to the capture of business from weldings and forgings—though this was by no means a " one-way street."

A section of the questionnaire was devoted to complaints and here engineers' requirements were listed under eleven headings. Lower prices (at 12 per cent.) did not head the table, the lead being given by requests for fewer defects due to carelessness (at 22 per cent.). Second came requests for " better delivery." (Tardy delivery of goods was recently dealt with in strong terms by Sir William McFadzean, president of the Federation of British Industries, so that it would appear to be an international rather than a national failing.) Better quality-control, closer tolerances, and superior finishing and cleaning were wanted by between 12 and 16 per cent. of the American buyers, but it should be pointed out that criticisms were only carried in 12 per cent. of the replies, whilst seven per cent. expressed satisfaction.

It is possible that the American user of castings is restricted in the area from which he can buy owing to the immense size of the country. In Great Britain, this factor, whilst still important, is less onerous, and the lorries of the foundries which have achieved a high reputation can be seen on main roads of the country quite far removed from their home town. The American forecast of $4\frac{1}{2}$ per cent. per annum increase in foundry business during the next five years is not extravagant and we would hazard a better figure than this for Europe and this country. Finally we quote the last paragraph from the *Foundry* article as it is fundamentally applicable to wherever castings are made. " Basically, all the foundryman has to do is to make better castings consistently and to deliver them on time. The market exists, but it is not private property—any other form of fabrication can take it away by making parts better, faster, or cheaper —but primarily making them better."



COLIN H. KAIN, A.M.I.Mech.E.

Chairman of the British Steel Founders' Association and Managing Director of Lake & Elliot, Limited

Featuring . . . .

MR. COLIN H. KAIN

MR. COLIN HOWELL KAIN, though he was born in Sheffield and spent his early life in Lancashire (where he acquired the pleasing northern accent which he still retains) has been working in Essex since 1926. That year—as a steelfoundry chargehand—he joined Lake & Elliot, Limited, of Braintree, the firm where he is now managing director. When a few years ago the Braintree firm acquired National Steel Foundry (1914), Limited, located at Leven in Fifeshire, he became chairman of that company too, with the result that he now commutes between Essex and Fife.

Mr. Kain takes a major interest in the technology of foundry practice not only in connection with his firm's productions, but nationally also. He likes to recall that in 1935 he was secretary of a sub-committee of the Institute of British Foundrymen which produced the first-ever recommendations on standardized dimensional tolerances for castings. Again, his name is associated with the development of the clover-leaf design of test-bar. When he was president of the London branch of the IBF in 1933, he delighted guests at the anual dinner by providing menu cards nestling in castings made in the form of oyster-shells.

In 1953, Mr. Kain was elected chairman of the British Steel Castings Research Association, a position where during five-and-a-half years' tenure his great enthusiasm for technological progress permeated the whole organization and resulted in outstanding benefits to the industry. Within the last year he has attained one of the highest offices the foundry industry can bestow—chairmanship of the British Steel Founders' Association. In this new responsibility, his wise counsel can be depended upon to pilot the Association through the quite difficult period lying ahead.

He is also the chairman of the Braintree College of Further Education and has seen it grow in 20 years from a small evening institute to a College with 2,000 students and including a department devoted to foundrywork. In 1951, Mr. Kain was admitted to the Livery of the Worshipful Company of Founders and to the Freedom of the City of London and this year he is serving as a Steward to the Company.

Having written many technical papers, Mr. Kain's hobby is now advising his friends to cultivate one and never achieving it himself.

Forthcoming Events

MARCH 6

Institute of British Foundrymen

Lancashire branch: "Are New Corebinders Worthwhile in the Jobbing Foundry?", by E. H. Beech, 7 p.m., at the Midland Hotel, Manchester.

Sheffield branch: "Running, Gating and Feeding of Blackheart Malleable," by W. J. Campbell, 7 p.m., in the Technical College, Pond Street, Sheffield.

MARCH 7

Institute of Metals

South Wales local section: "Fracture of Metals," by K. E. Puttick, 6.30 p.m., in the Metallurgy Department, University College, Singleton Park, Swansea.

MARCH 8

Institute of Vitreous Enamellers

Southern section: Annual general meeting will be followed by discussion on "Application of Cover-coat Enamels including Sheet and Cast, at 7.30 p.m., at the Constitutional Club, London, W.C.2.

Manchester Metallurgical Society

"Solidification and Structure of Cast Iron," by I. C. H. Hughes and W. Oldfield, 6.30 p.m., at the headquarters of the Manchester Literary and Philosophical Society, George Street, Manchester.

Institution of Production Engineers

Preston section: "Recent Developments in the USSR, by Dr. D. F. Galloway, 7.30 p.m., at the Harris College, Corporation Street, Preston.

Institution of Mechanical Engineers

Group of papers arranged by the internal combustion engines group committee on the "Mechanics of the Formation and Adhesion of Deposits arising from the Combustion of Liquid Fuel, 3 p.m., at 1, Birdcage Walk, London, S.W.1.

MARCH 9

Institute of Metals

London local section: Annual informal dinner, 7 for 7.30 p.m., at the Horseshoe Hotel, Tottenham Court Road, W.1.

East Midlands Metallurgical Society

"Metallurgy of the Steam Turbine," by L. E. Benson, 7.30 p.m., in the Faculty of Applied Science, Clifton Boulevard, The University, Nottingham.

Liverpool Metallurgical Society

"Creep Formation," by D. M. McLean, 7 p.m., in the Department of Metallurgy of the University of Liverpool. (Joint meeting with the Iron and Steel Institute.)

MARCH 10

Institute of British Foundrymen

East Midlands branch: "Moulding Sands," by W. B. Parkes, 7 p.m., at the College of Arts, Derby.

Tees-side branch: "Practical Foundry Techniques," by H. Haynes, 7.30 p.m., in the Teesdale Hall, Head Wrightson & Company, Limited, Thornaby-on-Tees.

Beds & Herts section: "Men Only" dinner, 7.15 for 7.45 p.m., at the Wilbury Hotel, Letchworth.

MARCH 11

Institute of British Foundrymen

West Riding of Yorkshire branch: "Light-alloy Castings," by T. A. Williams, 6.30 p.m., at the Bradford Institute of Technology.

Scottish branch: "Some Aspects of Steel-castings Inspection," by W. A. B. Ritchie and D. S. McPhail, 2.45 p.m., at the Royal College of Science and Technology, George Street, Glasgow.

Newcastle and district branch: Visit to Armstrong Whitworth (Metal Industries), Limited, Close Works, Gateshead 8. (Details from the secretary.)

Bristol & West of England branch: Discussion groups, 2.30 p.m., at the Central Technical College, Exeter.

SIR ALFRED MCALPINE & SON, LIMITED, have ordered a fleet of 24 heavy-duty dumptrucks from Leyland Motors, Limited (Lancs), for use in construction of the next portion of Britain's motorway between Birmingham and the M6 near Preston.

Diploma in Technology

The five most recent awards of the Diploma in Technology made by the National Council for Technological Awards brings the total number to 457—450 to men and seven to women. The first courses to be recognised by the Council as leading to the award of the Diploma were approved in 1956 and the latest figures released by the Council show that at present there are 4,969 students studying for the award. This most satisfactory result, says the Council could not have been achieved without the enthusiastic support of both colleges and industry.

The Diploma in Technology is equivalent in standing to an honours degree at a British University, and courses leading to the diploma comprise both academic study and industrial training. The awards are denoted by Dip.Tech.(Eng) for engineering and Dip.Tech. for other technologies. Since December, 1959, the Council has offered a higher award—Membership of the College of Technologists (MCT), which is broadly equivalent to the Ph.D. degree of a university. Already 20 applicants have been registered as candidates for membership of the College and a further 10 applications to register are at present under consideration.

Visit of Japanese Foundrymen

An extensive tour of European foundries and research establishments by a team of eight prominent Japanese founders was concluded by a visit to Britain from February 20 to 25. The Japanese foundry industry has made considerable strides forward in recent years, although its productivity is still capable of development for it to measure up to Western standards. The object of the study team's visit was to observe various phases of foundry organization and practice in Europe.

The Council of Ironfoundry Associations arranged the British programme of visits at the request of the Ministry of Power and the Foreign Office, and in conjunction with the British Steel Founders' Association. The team were given an opportunity of seeing the work carried on by the British Cast Iron Research Association, where they were entertained by the director, and also visited the National Foundry College. Afterwards they were conducted round the Ford Motor Company's Thames foundry, before the party left for Sheffield to conclude their tour as guests of the BSFA.

NSMP Notes

The National Society of Master Patternmakers are to hold their next general meeting in Glasgow on March 15. In addition, there is to be a dinner in the evening at More's Hotel, India Street, Charing Cross, Glasgow, at 7 for 7.30 p.m., and to this non-member patternmakers are being invited as guests. Later, there will be a "round-table" discussion of the aims and activities of the Society with a view to interesting the visitors in the benefits which accrue from membership. Those wishing to receive further information about the function are invited to write to the NSMP secretaries, Fisher & Firkins, at 12, Cherry Street, Birmingham, 2.

STRUCTURAL WORK on the new £1,000,000 blast furnace at the Dagenham works of the Ford Motor Company, Limited, is due to start at the end of May. The furnace is being built by Ashmore, Benson, Pease & Company, Limited, and is to come into operation in October, 1962.

De-sanding of Cylinder-heads with Molten Caustic Soda

Process used at the Farington Foundry of Leyland Motors, Limited.

*By C. S. Johnson B.Sc. A.I.M. and R. Williams A.I.M.**

One of the bugbears of cylinder-head production has long been the possibility of partially-burnt-on sand remaining in the interior spaces after decoring, shakeout or shotblasting. To rid themselves of this worry, Leyland Motors have installed a sizeable plant for dissolving out any such sand in a bath of molten caustic soda. What follows is a detailed account of the set-up of the plant and its method of operation.

Even with first-class modern coremaking techniques and special care in normal cleaning and shotblasting, it is difficult to guarantee that all the intricate and largely inaccessible internal passages in commercial-vehicle cast-iron cylinder-heads are completely free from traces of sand, and therefore a supplementary cleaning process which can economically give such a guarantee has a considerable attraction. Processing trials on production castings on a pilot plant at the Alkali Division of I.C.I., Limited, Northwich, established that immersion in molten caustic soda satisfied the requirements and basic data were obtained for the design of a production plant. This was then finalized and constructed in close collaboration with I.C.I., Limited, by Thermic, Limited, and Leyland Motors' engineering departments.

Description of Plant

Because of the nature of the process, the molten-caustic treatment plant is housed in a separate building adjoining the castings processing section, both to simplify application of the necessary safety measures and to ensure best possible working-conditions. A situation was chosen adjacent to the castings fettling bay, alongside the natural flow path of the castings to be treated (between rough internal cleaning and following the first shotblast operation and stress-relieving).

By reference to the plan diagram Fig. 1 it will be seen that the treatment plant consists of a pre-heating oven (A) heated partly by the flue-gas from the caustic bath (B), and partly by independent gas-burners. The molten-caustic tank, which is constructed of welded mild-steel plate 1-in. thick, is of generous proportions in relation to the size of the charge, being 5 ft. by 3 ft. 3 in. by 4 ft. 6 in. deep, and holds 3½ tons of caustic soda. It is heated indirectly by gas burners. Special precautions have been taken in the design to ensure that there is no local overheating of the tank which would give rise to excessive oxidation and markedly reduce the life of the tank, which otherwise is expected to be of several years' duration. The temperature of the bath is automatically controlled at 500 deg. C.

Use of the relatively large bulk of caustic soda provides a large heat reservoir which reduces the temperature drop on introducing a new charge, thus maintaining a high average temperature of treatment. The tank is also sufficiently large to be capable of being converted if required to the "sodium hydride" process of de-scaling, as it was felt there might be a possible future requirement for this.

Following the caustic bath, there is a draining table (C) followed by the cold- and hot-wash tanks (D) and (E) respectively. A feature of the cold-quench tank is that it is deep enough for the basket to enter and the top lid to close before the basket is lowered further for immersion. The hot-wash water is heated by submerged gas-fired "flame tubes." The castings are handled through the plant in stout wire-mesh baskets, which are transported into and out of the department on gravity roller-conveyors. Processing through the various tanks is accomplished by the means of two overhead monorail-mounted hoists, operated by remote control.

In the design, special attention was paid to the provision of adequate fume-extraction to ensure very good working-conditions and powerful extractors are fitted over the caustic bath and the cold-water quench-tank. In addition, a "curtain" of fresh air is blown in over the top of the caustic tank to provide better ventilation control. The caustic-tank, draining-table, and cold-quench tank are all completely screened as a precaution against splashing, and the manipulation of the charges into and out of the baths is accomplished by the operator from outside the screen. For access and egress to and from the screened section, the basket of castings passes through double swing-doors. It is necessary to change over hoists at the draining section, and this is also done from outside the screen. The floors in the draining area inside the screen

*Of the Authors, Mr. Johnson is foundries manager, Leyland Motors, Limited, and Mr. Williams is technical service officer, Alkali Division, I.C.I., Limited.

and in the working area outside are covered by a metal grille to allow splashing of either caustic or liquid to drain away, and also to facilitate easy cleaning. The floor drains into a sump, which also collects the overflow from the cold- and hot-rinse tanks. The effluent, after separating sludge, is not strongly caustic and can be accepted into the normal sewage system.

Plant Operation

Figs. 2 to 4 show some of the features of the plant in operation. While the caustic-soda treatment has been found to be very effective, it is desirable to avoid introducing excessive amounts of sand into the bath, as much of it accumulates in the tank as a sludge which needs to be removed regularly. Therefore, the castings are first externally shotblasted, and the bulk of the sand is removed from the internal passages by a rough cleaning operation.

The processing plant itself is divided into four stages—preheating, caustic immersion, draining and cooling, and, finally, washing in the cold-quench and hot-rinse tanks. The cycle time for the castings in each stage is 30 min. overall. Following

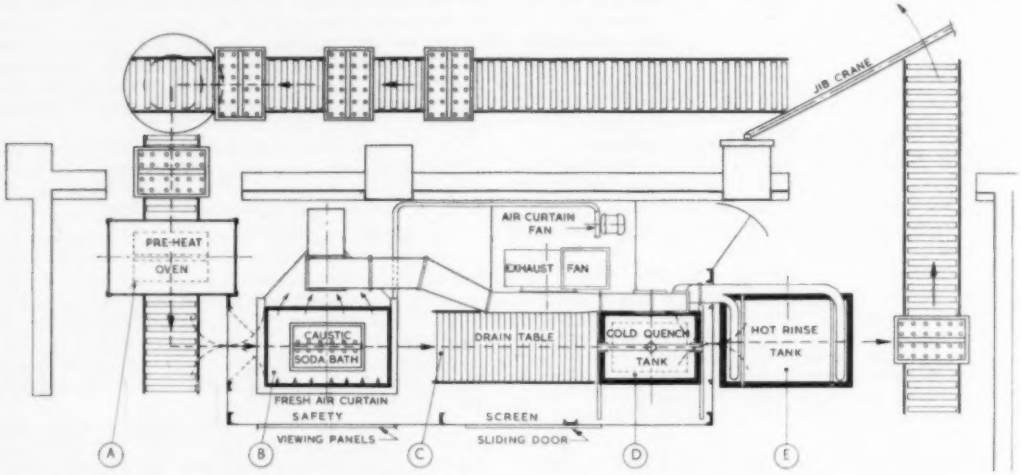


FIG. 1.—*Plan view of the molten caustic-soda de-sanding plant at Leyland's Farington foundry.*

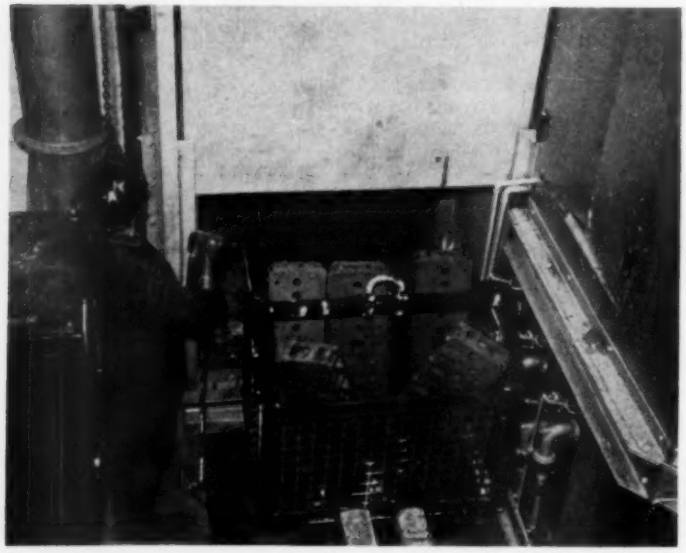


FIG. 2.—*Overhead view of the plant, showing cylinder-head castings in the work basket being removed from the preheating furnace on roller track.*

rough cleaning, castings are loaded into the work baskets in such a position as to avoid internal air locks and to be self draining, and are conveyed on the roller path into the first preheating stage. Here the castings are heated for 25 min., reaching a temperature of 130 to 150 deg. C. Objectives of preheating are to make certain that the castings are completely dry, to reduce the thermal shock on entering the caustic bath, and to relieve somewhat the thermal load on the caustic bath. After preheating, the basket is picked up by the first of the

FIG. 3.—*Gas-heated caustic tank and its screening. A work basket is being lowered into the molten caustic bath held at 500 deg. C. (the screen door on the right is open only for the purposes of taking the photograph).*

electric hoists, taken through the screen doors, and lowered into the molten caustic bath which is held at a nominal 500 deg. C. The basket of castings remains in the bath for 25 min.

Following immersion, the castings are removed and allowed to drain for three minutes over the bath, followed by a further draining time of 20 min. on the gridded floor-area between the caustic bath and the wash tank, the hoist being disengaged to permit its return for picking up the next basket. During this time the castings also cool down to approximately 250 to 280 deg. C., which lessens the thermal shock at the next stage —the cold quench.

Although there is a continuous flow of water through the wash-tank it is nevertheless necessary to raise and lower the basket twice to rinse out the internal passages as thoroughly as possible. After 10 min., the basket and castings are transferred to the hot-rinse tank, where the washing is completed by a further 15-min. immersion, and again the basket is raised and lowered to rinse out the castings interiors. A small flow of fresh water is passed into the hot tank and the temperature of the water here is maintained at 80 deg. C., that is, high enough for the castings to be self drying after final removal from the plant.

Despite precautions designed to minimize the presence of excessive amounts of sand in the castings, sludge accumulation in the caustic tank amounts to approximately 0.45 cu. ft. per ton of castings processed. This must not be allowed to build up in the tank, as it reduces the rate of heat transfer to the caustic and could cause the steel tank to become overheated, and thus shorten its life. To facilitate sludge removal, two trays are inserted in the tank's bottom and these are lifted out after each day's work, carrying much of the sludge with them; the remainder is removed with the aid of a long-handled scoop. After some cooling, these trays are quenched in the cold-quench tank to remove the sludge, and are dried and preheated before re-insertion in the caustic bath. The wash tank also contains a similar sludge-tray which catches most of this washed sludge from the caustic-bath trays, and this too, is lifted and the sludge collected in containers. The remaining sludge in the wash tank is periodically removed when the tank is emptied, being washed

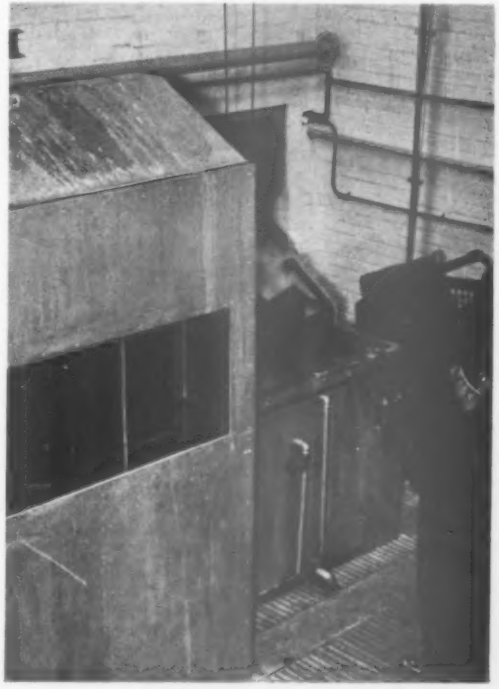


FIG. 4.—*Castings being lowered into the final hot-water wash. The cold-quench tank can be seen on the left, behind the screen.*

down the outflow into a settling sump in the drain, from which it is removed and added to that obtained from the sludge tray. The sludge being still moderately caustic is buried on a tip. With the type of work treated, the loss of caustic due to drag out and also sludge removal amounts to an average of 44 lb. per ton of castings processed. This is made up regularly by additions of flake caustic.

Safety Precautions

In designing the plant, every possible precaution has been taken to reduce to the absolute minimum the inevitable hazards that must exist in dealing with such a material, but for normal operation it is necessary for the operator to always wear goggles and a protective helmet against the unusual event of splashes coming out of the screened area. For entry into the screened area—as is necessary for de-sludging for instance—protective clothing and a helmet with a hood are worn.

As a further precaution, buffered phosphate solution is available in the plant in eye-wash bottles ready for immediate use and as a bulk supply to flood any affected part of the person. The operators are shown how to give first aid on the spot in the unlikely event of a mishap, and are instructed in the need for observing reasonable precautions and avoiding over-familiarity with the caustic material. Printed notices on the plant serve as a constant reminder.

The main precautions as regards the plant itself concern the caustic tank, which is regularly inspected on its exterior through apertures provided for the purpose, to check uniformity of heating and general condition, and the interior is examined at intervals of approximately two months by probing to check the extent of any erosion and the soundness of the welds. The tank will be emptied annually for a more-thorough examination. To empty the tank for this purpose or in the case of a premature failure, the contents whilst molten can be pumped out into suitable containers.

Conclusion

Following the treatment of several thousand castings on a production basis and regular examination by sectioning processed cylinder heads, it has been found that the process is completely reliable and economic and gives the guarantee of freedom from sand that was sought. It perhaps hardly needs stating that the caustic soda cannot be expected to remove metal penetration and "flash," and therefore the usual precautions to avoid these are still necessary.

The Authors thank the directors of Leyland Motors, Limited, for permission to publish details and illustrations of the plant.

NORTHERN FOUNDRY CONSULTANTS, 1, Speeton Grove, Bradford, 7, have been established to undertake contracts which their name implies.

Catalogues

Die Steels. In publication No. 550, Hadfields, Limited, of Sheffield 9, deal with a series of high-duty steels entering under this general heading. Some are for the hot forging of steel, some for hot pressing of brass, for cold drawing, for hot and cold extrusion of metals, etc. The section in the catalogue which will most interest JOURNAL readers is that covering die-casting moulds. The latter range from those made from plain carbon steels to types produced from Cr, Ni, Mo, W and V steels. It is obvious that the development of such complex alloys has necessitated years of research and practical experience of the problems arising.

X-ray Analyser. In list No. 177/2, entitled "Microscan X-ray Analyser," the Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, illustrate and describe, in great detail, new apparatus which, by providing both X-ray and electron pictures of small surface areas, has proved valuable in research laboratories. It is stated to be suited to the investigation of problems concerned with the detailed composition of metals and alloys, giving both analytical and structural information. Magnification can be controlled from 250 to 3,000 diameters and the accuracy for quantitative analysis is given as ± 1 per cent.

Contractors' Tools. In publication LC-45-1, Frank Parker & Company, Limited, 77-81, Curtain Road, London, E.C.2—a member of the Thos. W. Ward group of companies—list an extensive range of tools and plant used primarily by contractors, but, in fact, also by all manufacturing firms. The list, running to 16 pages, goes from adzes to wrenches. In addition, a wide range of protective clothing is included and the whole makes a useful catalogue for engineering buyers to have on their desks.

Heat-resisting-alloy Castings. In publication No. 6008, Henry Wiggin & Company, Limited, Wiggin Street, Birmingham 16, cover the use of "Nimocast" alloy for the production of special high-duty heat-resisting castings. Seven alloys come under this trade mark and the brochure tells by letterpress and illustration of their composition and applications. Some of the castings illustrated are of such a quality that they are a credit to the whole industry.

Weighing and Testing Machines. A folder received from Saml. Denison & Son, Limited, Hunslet Foundry, Moor Road, Leeds 10, illustrates and annotates a dozen typical examples of weighing and testing machines which the company manufactures. As the folder is intended only to be an introduction to the subject, a "reply postcard" is enclosed for the use of those interested in obtaining more information.

Plotting Table. Publication No. 1806, issued by Bryans Aeroquipment, Limited, Willow Lane, Mitcham Junction, Surrey, describes and illustrates a trace interrupter which is used as an accessory of the firm's "X" & "Y" co-ordinate plotting table. The table enables curves to be plotted in numerous patterns of trace instead of a full line.

Shaker-hearth Furnaces. In publication No. R23, Efco Furnaces, Limited, Queens Road, Weybridge, Surrey, shows diagrammatically four methods of quenching arrangements which can be incorporated with their shaker-hearth furnaces. Such units are illustrated and described in considerable detail in this eight-page brochure.

Abrasion Resistance of Vitreous Enamels*

The investigation described was carried out with the object of devising a reliable method of testing the abrasion resistance of vitreous enamels that would give reproducible results with a sufficiently sensitive enough differentiation between different enamels. The main part of what follows describes the recommended apparatus and its *modus operandi* that was the practical upshot of the work carried out. The report is followed by an abstract of the main technical points made during a discussion at a meeting of the Institute of Vitreous Enamellers where it was presented under the chairmanship of Mr. J. W. Gardom.

When the IVE "Abrasion Resistance" sub-committee began work, the following methods of testing abrasion resistance that have been used in the enamelling industry were first considered:—

Diamond-scratch Test

This method, in which a loaded diamond point is drawn over the surface, will differentiate very well between different enamel surfaces but is unreliable because of possible variations between different diamond points.

Abrasion-resistance Test (*BSS* 1344:1947)

This method consists of scratching the surface of the enamel by means of powders of specified fineness, corresponding in hardness to Moh's scale. A small amount of powder is sprinkled on to the enamel surface, covering approximately ¼ sq. in. of the surface, covered with chamois leather and loaded with a 2-lb. weight of specified dimensions. The leather and weight is then drawn to and fro, over ½-in. travel of the surface 10 or 12 times. The criterion of failure is visible scratches caused by powder of hardness 6 (felspar) or lower, when viewed through a pocket microscope of magnification ×8. This method was considered unsuitable because it does not differentiate enough between enamels.

Taber Abraser

This test consists of a mechanical method in which the sample plate is rotated in contact with abrasive wheels under a predetermined load. The method of estimation is by loss of gloss or loss of weight after a stated number of revolutions. The results obtained with this machine are consistent. The method was considered to be unsuitable because the machine is expensive and of foreign origin. The abrasive wheels deteriorate with age and must be replaced after one year.

Standard Method of Abrasion Measurement introduced by the Porcelain Enamel Institute of America

This method is substantially the same as the method adopted by the sub-committee and described below. The machine now used in the PEI test consists of a moving table which describes an eccentric circle so that the abrading charge on the sample plate moves in a circle of 1-in. dia. The criterion of wear is the total loss of weight, or loss of gloss, after a specified time of abrasion.

* Sub-Committee Report of the Institute of Vitreous Enamellers.

Test Apparatus Adopted

The machine agreed upon by the committee to be tested for reliability was built by Gallenkamp, Limited. This comprises, essentially, a table, to which the sample plate is clamped, that moves with a to-and-fro motion. The clamping device is constructed so as to contain the abrading charge of a specified weight of sand, steel balls and water. The table is driven by an electric motor, *via* an eccentric pin- and lever-mechanism at the rate of 300 +3, −0 r.p.m.

Reproducibility of Results

Nine samples of a standard titania-opacified white-enamel were prepared at the same time, under conditions as nearly as possible the same. The abrading charge used was:—175 gm. stainless-steel balls of $\frac{5}{32}$-in. dia., 3 gm. sand, graded between 72 and 100 mesh BSS sieves, 20 ml. distilled water. The loss in weight of the samples was measured after 5, 10, 20 and 30 min. of abrasion. The machine was re-charged with sand and water every five minutes, the old abrading charge being washed away. The results are summarized in Table 1 and Fig. 2.

The loss in weight of the samples up to 15 minutes of abrasion is very low. The loss of weight after five minutes abrasion is so small that the percentage deviation is very high. This is because some of the weight differences are within the weighing error of the balance. These figures should be ignored. Control of weighing conditions should be as fine as possible. The test plate should be dried thoroughly preferably by heating to 110 deg. C. and cooling to weighing-room temperature in a desiccator. Preparation of test pieces is therefore critical. This should be so carried out that chipping during the test is eliminated completely. For test pieces cut from panels that cannot be accommodated on the machine, some method of sealing the cut edges must be adopted.

The results of the tests show the required consistency for the method and the apparatus to be used for tests. A further three panels were tested to check the results obtained with different enamels. These results are summarized in Table 2 and Fig. 2.

These results show that the method will distinguish between different enamels with sufficient preciseness.

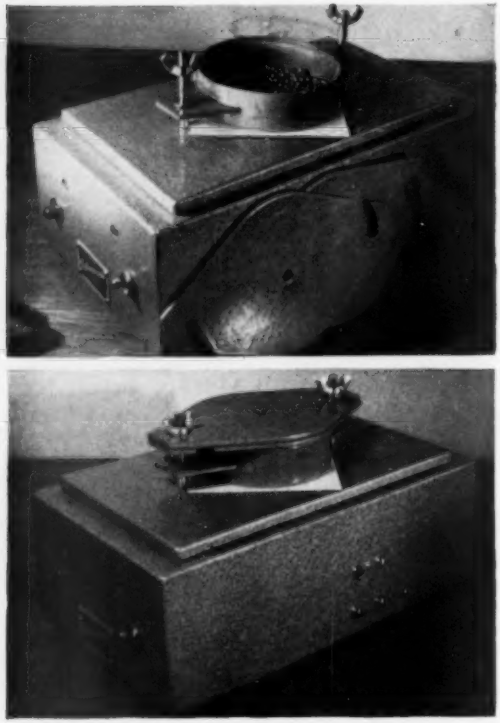


FIG. 1.—*Recommended design of machine for testing abrasion resistance, shown with cover plate removed (above) and in position (below). The white-enamelled sample plate can also be seen.*

Reproducibility of Apparatus

Three machines were ordered and tested together with the original machine. For this trial the abrading charge used was:—175 gm. stainless steel balls, 3 gm. graded sand, 25 ml. distilled water. The test plates were weighed after 10, 15 and 20 min. of abrasion. The abrading charge was replaced every five minutes. The results are summarized in Table 3.

Sample No. 2 on machine No. 2 could have lost weight by accidental chipping. As the divergence of results on machines 1 and 2 appeared to be high, a further four samples, one on each machine were tested. These are the third samples in Table 3. These results indicate that the machines are consistent enough to be used as standard-test machines. The machines must be securely fixed during test. A series of tests were run with the machines free-standing. The results obtained with each machine were consistent, but varied considerably between the separate machines.

Comparison of Sands

Another series of tests was carried out, using machine no. 4, to determine whether the source of sand had any influence on the results. These tests are summarized in Fig. 3 and Table 4. These results indicate, without doubt, that the source of the abrading sand is critical. The majority of these sands is described as sub-angular in type, so that sands of the same type do not have the same effect when used as above. The different samples of Redhill sand tested show that chemical treatment has not effect on the sand's abrasive characteristics.

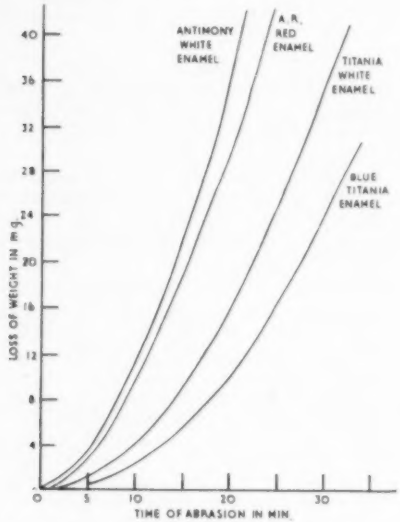


FIG. 2.—*The correlation of the period of abrasion with loss of weight, demonstrates the satisfactory distinction between different enamels achieved by the method.*

TABLE 1.—*Cumulative Weight Loss, mg.*

Sample.	5 min.	10 min.	20 min.	30 min.
1	1.2	4.7	17.3	36.6
2	1.4	4.5	18.8	39.5
3	0.7	4.2	18.3	38.7
4	1.2	4.1	14.5	33.7
5	1.5	3.4	15.1	33.5
6	1.3	3.7	15.2	34.2
7	0.8	4.0	15.2	32.2
8	1.4	3.8	15.4	34.3
9	—	4.0	16.2	36.5
Mean	1.2	4.04	16.2	36.4
,, deviation ..	0.22	0.3	1.3	2.0
,, ,, as percentage	18.3	7.2	8.0	5.7

TABLE 2.—*Cumulative Weight Loss, mg.*

Sample.	10 min.	20 min.	30 min.	Enamel type.
B.1	2.3	10.2	24.0	Titania-type blue cover coat.
W.1	10.8	36.3	66.4	Antimony white cover coat.
R.1	9.1	29.9	54.6	A.R. clear red cover coat.

The committee decided to specify Redhill sand as the standard abrading medium.

Procedure

The 4 in. by 4 in. test plate is cleaned and dried. This may be done by wiping with alcohol or ether using a non-fluffy material to remove any grease or dust and drying in an oven at 110 deg. C. When the plate has attained the temperature of the weighing room, preferably in a desiccator it is weighed as accurately as possible to the nearest 0.1 m.g. The same procedure is to be used for drying before each weighing during the test. After weighing, the test plate is placed on the machine, the sealing ring and clamp ring located on it, and the abrading charge loaded on to it. This comprises:—175 gm. stainless steel balls of $\frac{5}{32}$-in. dia., 3 gm. Redhill sand passing through 72 mesh sieve, remaining on 100 mesh sieve. The sieves are of BSS 410.

TABLE 3.—*Cumulative Weight Loss, mg.*

Machine.	Sample.	10 min.	15 min.	20 min.
1	1	2.7	5.9	13.9
	2	3.8	9.3	15.6
	3	3.9	7.9	15.4
2	1	2.9	6.8	12.6
	2	3.8	9.8	15.7
	3	3.8	8.4	15.1
3	1	3.1	7.4	13.0
	2	3.6	8.3	14.6
	3	3.8	8.6	14.8
4	1	3.2	8.0	13.6
	2	3.5	7.4	13.5
	3	3.8	8.5	14.6
Mean		3.5	8.3	14.4
,, deviation ..		0.34	0.71	0.87
,, ,, as percentage		9.7	8.5	6.0

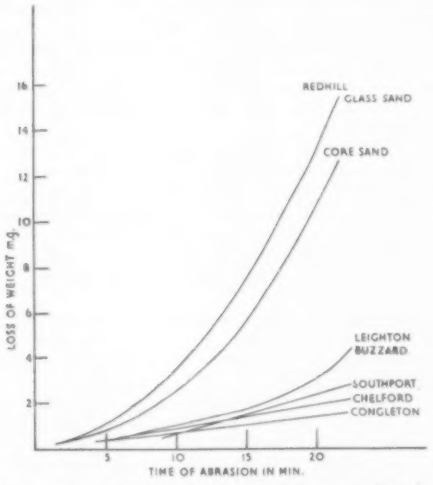


FIG. 3.—*Critical nature of the source of the abrading sand is clearly illustrated in the above graph and led to the investigating committee specifying the use of Redhill sand.*

The clamp plate is placed over the clamp ring and tightened to form a water-tight seal. 25 ml. of distilled water are then added through the hole in the clamp plate. At five minute intervals, the machine is stopped, the old abrading charge is washed away, the steel balls washed and dried, and a new abrading charge added. The loss of weight of the test plate is measured for as long as is required to obtain a graph of the relation between loss of weight and time of abrasion. For most enamels, the loss of weight for the first five minutes of abrasion will not be significant. It is suggested that weighing be commenced after 10 min of abrasion. Most enamels will show significant losses in weight after 30 min. of test.

TABLE 4.—*Loss of Weight, mg.*

Sand source.	Test.	10 min.	15 min	20 min.
Leighton Buzzard ..	1	1.0	1.9	3.8
Congleton	1	0.7	1.6	2.0
	2	0.2	0.9	1.0
Southport sea sand ..	1	0.7	1.5	2.3
	2	0.7	1.5	2.5
Chelford	1	0.9	1.0	1.9
	2	0.6	1.5	2.0
Redhill glass sand ..	1	3.5	7.6	12.6
	2	3.3	7.4	13.8
Core sand	1	2.1	5.4	10.0
	2	2.9	6.2	11.8
	3	2.4	5.6	10.1

DISCUSSION

MR. S. E. A. RYDER said that if the report were to be published to establish an Institute standard, he would like to see quite a bit of alteration in the method of weighing the samples. Also he would like to see incorporated in the report practical details concerning the method of handling the sample plates in the air, after they had been dried in an oven at 110 deg. C. They should be handled carefully, not with the fingers, and regard must be paid to humidity; obviously this was most important for the weighing was to be done to the nearest 0.1 mg. He asked how much difference there would be in the time required to obtain the results if one did not change the charge at five-minute intervals; and whether the time of the standard tests could be altered so that we could get a better comparison between the samples.

Next, he asked how the used abrading charge was removed without making a mess all over the top of the machine; and, finally, whether any change took place in the sand during the period of abrasion.

DR. NIKLEWSKI, commenting on the handling of the sample plates, said they must be dried out 100 per cent. A desiccator should always be used. The weighing should be done by somebody who could really operate the delicate balance, probably a technician or a chemist. The sub-committee had not specified any particular method of removing the

abrading charge and they preferred that users of the machine should decide that for themselves. The water could be sucked out by means of pipette. In any case, the method used for that purpose would not affect the accuracy of the results obtained from the machine. The sand in the abrasive charge did not break down. The fine particles of abraded enamels put a brake on abrasion. There might be some kind of suspension forming. That was why the sub-committee insisted on changing the abrading charge every five minutes. As to the alteration of the time over which the sample plates were abraded, he said the abrasion curves were at first very flat, then they turned upwards rather steeply and became linear; there was no point in continuing the abrasion after 20 or 30 minutes because the curves then remained linear. The first two of the newly devised machines were free-standing and in operation they "walked" slowly along the bench due to the to and fro motion of the table to which the sample was clamped. Brackets had now been fixed to the bottom of the machine. They have to be screwed to the bench in order to prevent "walking" of the machine. Movement of the machine influenced the determinations because part of the energy applied would be devoted to that movement.

Gas-industry's Reactions

MR. E. W. B. DUNNING said the gas industry was not prepared to accept a sample plate as being the same as the enamel on a gas cooker; indeed, very often one could not take a piece as large as 4-in. sq. from a gas cooker. Whereas the weight loss was something which the enamellers wanted to be able to measure, the customer was interested in loss of gloss. Even though it might take a long time to abrade a particular enamel through a millimetre, once the skin was lost it would still be unsatisfactory for the customer, because the gloss started to go and the dirt got in. He had gathered that the new machine was developed by the sub-committee because the British Standard test was not very satisfactory; but he asked if there were any relationship between the two. Table 2 in the paper gave figures for three enamels of different softnesses; he asked what softness figures they gave in the British Standard test, whether they gave the same numbers or varied. He emphasized again that the gas industry's problem was to be able to test complete appliances.

DR. NIKLEWSKI replied that the sub-committee's aim was to develop a testing machine not for the trade as a whole, not for the appliance manufacturer or customer, but for use in an enamelling plant in differentiating between one enamel and another. The new testing machine was not one that could be applied by someone who was buying appliances; they were unable to devise a method which could give an exact measurement without destroying the appliance. The sub-committee did not compare their test with the British Standard, which was useless to them as enamel users; they wanted something still more exact. In the first five minutes one could register the loss of gloss on a hard enamel, on a scale, but one could probably register the loss still better with a gloss meter.

Alternative Possibilities

MR. A. BIDDULPH said that in describing the new test the sub-committee had established that they did not depend on measurements taken after abrading for five minutes; they wanted to go on for 20 or 30 minutes, for the longer they continued the abrasion the less was the margin of error. After five minutes they could detect some loss of gloss. He suggested it might be worth while considering whether, not to replace the new test but as a supplement to it, they might be able to devise some means of abrasive attack which was less severe, using perhaps a softer sand, plastic balls intead of steel balls, or something like that, whereby they could bring about in 30 minutes a degree of loss of gloss which with their present test they could achieve in two or three minutes.

DR. NIKLEWSKI replied that the tool suggested by Mr. Biddulph would be very valuable, but also very expensive. Probably some frit manufacturers could acquire it and use it, but he felt it would be a little too much to ask the ordinary enamellers to go to that expense. The Americans had their method; but the effort of the sub-committee was to produce something which the ordinary enamellers could acquire.

MR. H. W. WADE said it was assumed that the sand alone was the abrasive material, and he asked if there were not some abrasion from the steel balls. Could they not also be standardized for hardness?

DR. NIKLEWSKI replied that the sub-committee had introduced the stainless steel balls mainly to avoid corrosion, etc. They had not investigated the difference of hardness of the stainless steel balls. They did not abrade so much as the sand. They had always to stick to the same weight of stainless steel balls; that might mean adding one more ball after a time.

MR. J. TAYLOR said it seemed that the positioning of the test panel was precise; if it were not, then it would seem that one was presenting a new surface to the machine.

DR. NIKLEWSKI pointed out that on the machine there were four pins by means of which the sample panel was locked in position, and there was also a rubber washer. So that they were very careful to use the same surface for abrading.

MR. RYDER suggested that the important matter was the flatness of the sample panel; and he asked whether, if there were a little curvature on it or even a little orange peeling, it would have an effect. It would appear that there would be more abrasion on the "hills" than in the "dales."

DR. NIKLEWSKI said he did not know to what extent there was irregularity of the surface of the enamelled sample.

MR. A. W. MURDOCH agreed that it was important to have the surface of the sample panel very smooth. If we had two samples of the same enamel, one of them having an orange peel surface

and the other being very smooth, a difference would be shown by the PEI* test, and he supposed that would be the case also with the sub-committee's new test.

The CHAIRMAN said he imagined that would be very much dependent on the weight of the abrasive charge.

MR. MURDOCH added that that was why he was in favour of an earlier remark that the significant part of the test was the surface, not the sub-surface. Once the surface was disturbed, the sub-surface was less important because it corroded so quickly. So that he supported the suggestion to extend the period of the test; it would be a good thing to look more closely at the surface abrasion, which occurred in something between two and five minutes, and to try to extend the time to 30 minutes or as long as we could, either by using a different abrasive or reducing the amount of the same abrasive.

MR. W. THOMAS asked if there were a definite break in the curve as the sample passed through the test.

DR. NIKLEWSKI replied that the curve was continuous and it became more and more steep as the test proceeded. The surface of the sample would wear off, but they were not able to indicate particular points at which it would happen.

MR. BIDDULPH added that there had been a different distribution of grain sizes in the abrading materials as between two screens, which affected the results. A glass sand had been used, with grain size between 0.3 and 0.4 mm.

* Porcelain Enamel Institute of America.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

831,887. Geraetebau-Anstalt, Balzers, Liechtenstein.

A vacuum-melting and casting plant, by means of which several melting and casting operations can be carried out in succession without breaking the vacuum.

831,891. Foundry Equipment, Limited, 1831 Columbus Road, NW., Cleveland, Ohio, USA.

Mould-drying system which aims at improving the introduction of the heated air in such a way as to produce the necessary turbulence and flow to achieve effective internal drying of the mould.

832,034. Hawley Products Company, St. Charles, Illinois, USA.

This new and improved method for casting metals utilizes a porous mould or core of preformed fibrous heat-resisting material The invention aims among other things at eliminating sandblasting and wheel abrading, by a relatively simple and inexpensive process. A particular application claimed is in the manufacture of pipe ends.

832,323. British Iron and Steel Research Association, 11, Park Lane, London, W.1.

This invention has for its objective, uniformity in the cooling of the lateral members of an ingot mould by better distribution of the fluid and reduction of losses, and the causes of cavitation.

832,439. Seiji Nishikiori, 40 Jiodani, Hinaga, Chita-machi, Chita-gun, Aichi-ken, Japan.

A method and apparatus for casting steel ingots, which, by this process, are claimed to be free from contamination of foreign matter and gases. Use is made of a mould-coating composition.

832,555. Foundry Services, Limited, Long Acre, Nechells, Birmingham.

Exothermic material, or insulating or refractory materials for use in foundry practice. (See also B.P. 627,678). The idea of this invention is to provide materials which can be converted easily by the foundry to any specific curved shape without the necessity for moulding operations.

832,666. General Motors Corporation, Delaware, USA.

Improved ferrous metal, which, in the "as-cast" condition is claimed to have physical properties and microstructure comparing favourably with that of conventional pearlitic-malleable iron. It is also claimed to have a considerably higher modulus of elasticity than any conventional malleable iron, or than a nodular iron.

832,999. Freeman Chemical Corporation, 211 Main Street, Port Washington, Wisconsin, USA.

Improvements in foundry methods and compositions for foundry use. More particularly this Patent provides for the production of foundry cores, and moulds, for shell moulding.

833,308. Council of Scientific and Industrial Research, Old Mill Road, New Delhi-1, India.

A stainless steel which, while being nickel free, is comparable to 18:8 chromium-nickel steel, or, according to the inventors, might even be superior to this.

833,320. Hans List, 126 Heinrichstrasse, Graz, Austria.

In the manufacture of cast pistons, it is proposed to tie the hollow body, prior to casting, to a pipe coil to be cast-in simultaneously—later serving for the cooling of the piston. The method claimed by the inventor is said to afford greater flexibility of design, *e.g.*, it is claimed to be possible to provide an organic connection between an axially-symmetrical piston-head, and a rigid through-pin bearing.

833,378. Universal Marion Corporation, Jacksonville, Florida, USA.

Improvements in mould materials for casting group IVb metals of the periodic table (hafnium, thorium, titanium, zirconium, and their alloys). In particular it is an objective of the Patent to provide a bonded, granular, flowable material that can be rammed, blown, squeezed or jolted around a pattern and which will have a dimensionally-accurate mould cavity when the pattern is withdrawn. Cereal flour, cornflour or gelatinized corn-starch is claimed for use in the manufacture of this material.

833,486. British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham.

This invention relates to the manufacture of improved grey cast irons, especially nodular-graphite cast iron. The Patent also refers to the manufacture of such components as diesel cylinder-heads and liners, diesel pistons and gas-turbine castings—which are required to have good mechanical properties at elevated temperatures, *e.g.*, 300 to 600 deg. C. The nodularizing agent claimed is arsenic 0.06 to 0.15 per cent. with or without 0.07 to 0.20 per cent. of phosphorus.

BROADWELL ENGINEERING, LIMITED, have removed to new premises at Dudley Road East, Tipton, Staffs.

Equipment and Supplies

Polishing Machine

B. O. Morris, Limited, Briton Road, Coventry, announce that they are now in full production of model CFT. 40 automatic polishing machine (Fig. 2) for profiled components, *e.g.*, die-cast frames, profiled beadings, shaped surrounds, and the like. The component is held on a quick-action jig which incorporates a chain drive, following both concave and convex contours. Once the jig is engaged in the variable-speed-drive sprocket, it traverses through its whole length against the polishing mop or abrasive-band attachment.

Standard table size is 40 by 30 in., but this can be extended to suit any requirement by "outrigger" sections. In addition, two machines can be coupled as a duplex arrangement for two-pass work. The machine is said to be suitable for regular small-run work where the expense of a large-capacity automatic plant would not be justified, or where the length or shape of the component is awkward.

Cutting-up Large Heads

Scene photographed below is at the Dronfield scrap-yard, Sheffield, of English Steel Corporation, Limited, where it is reported that more than 500 tons of steel are reduced to furnace-size pieces each week using equipment and gas supplied by British Oxygen Company, Limited. Heads of mild steel, stainless and carbon steels weighing up to 45 tons are machine-cut on site. Manganese-steel slabs and armour plating up to 2½-ft. thick are also cut by this means. The illustration shows the MC.50 model gas-cutting machine on a rig developed by British Oxygen specifically for cutting ingot and heavy scrap. The machine cuts mild-steel 30-in. thick at more than 5 in. per min., it is claimed, oxygen supplies being piped from twin 47,000 cu. ft. (liquid) storage-tanks and "dissolved" acetylene from a "double-30" manifold.

FIG. 2.—*Automatic polishing machine for profiled components, produced by B. O. Morris, Limited.*

Gas-carburizing: When Wild-Barfield Electric Furnaces, Limited, of Watford, Herts, first supplied a number of pit-type gas-carburizing units to the East Indian Produce Company, Limited, for installation at National Engineering Industries, Limited, in Jaipur, India, box-carburizing of components had previously been the usual procedure. By the use of a drip-feed gas carburizing liquid developed by the company, known as "Carbodrip," the furnaces could work independently of raw town's gas supplies, and greater production was obtained from equipment of smaller capacity—a nominal working charge space being 24-in. dia. by 46-in. deep. The company reports that a second order has been executed for an additional furnace of identical capacity, and also a further increased adoption of the process by the receipt of an order for larger furnaces with working dimensions nominally 36-in. dia. by 54-in. deep.

Thermocouple Wires: Research & Control Instruments, Limited, 207, King's Cross Road, London, W.C.1, announce that the range of "Thermocoax" miniature thermocouple wires has been extended by the addition of two new and smaller sizes with outside diameters of 0.34 mm. and 0.25 mm. They are of "Chromel-Alumel" in stainless-steel sheaths, and are available in limited continuous lengths of up to six metres. Type numbers are 2ABACO34 and 2ABACO25 respectively.

Smoke Alarm and Densitometer: Lancashire Dynamo Electronic Products, Limited, Rugeley, Staffs, announce that an immediate price-reduction is being made on their series SME.2 smoke-alarm and densitometer equipment. The equipment is designed to monitor the density of smoke emitted from chimneys as a protection against the infringement of the Clean Air Act.

SECTION DEVOTED TO THE TECHNOLOGY OF PRODUCING DIMENSIONALLY-ACCURATE CASTINGS

Shell-moulding of Motor-cycle Cylinders*

By Lajos Kelemen

The selection of optimum casting position and runner system is of particular importance in the shell-moulding of motor-cycle cylinders and, in general, of any shell-moulded castings. This is all the more important because a modification of expensive cast-iron patterns is costly. Proper ventilation is very important because greater quantities of gas evolve in a shorter time than with conventional sand moulds.

The production of motor-cycle cylinders started in 1948 in the Iron and Steel Foundries of the Csepel Works. Cylinders of 100 cc engines were produced first, to be followed later by those of 125 and 250 cc. The following sizes of cylinders are being continuously produced at present:—250 and 125 cc for motor-cycle engines, 175 cc for scooter engines, and those of varying capacity for racing motor cycles.

Initially very small quantities (25 to 30 per day) were cast into oil-bonded, dry-sand moulds. With the increase in motor-cycle production, an increased number of cylinders was required and demands set at the start for 250 cc motor-cycle production could not be met with the old technique. In order to satisfy the growing demand for larger quantities and for better quality, a better casting technique had to be looked for and was found in the technique of shell-moulding.

Cylinders for 125 cc. engines were first cast in shell-moulds in 1955 and the experience gained then was utilized in the production of those of 250 cc capacity.

Patterns and Coreboxes

Much argument is still going on regarding the choice of pattern materials. Aluminium is recommended mainly for its lower specific weight and for the ease of fabrication, and cast iron for its durability. Factors, like the high thermal-expansion and thermal-conductivity of aluminium, are often ignored although they adversely affect the dimensional accuracy of patterns. The high thermal conductivity renders the removal of cores from core-boxes more difficult and—in the case of cores of more intricate shape—even impossible, since the shell-cores are not cured uniformly. Furthermore, it has been found that, using the same stripping agent, the shell sticks less to cast iron than to aluminium patterns. For these reasons, MOV 28 quality cast iron† is used for making patterns and pattern plates and is subjected to a stress-relief heat treatment. The design of pattern and stripper plates is light but strong, with thin walls but strong reinforcing edges.

Separately cast fins were bolted together in early cylinder-patterns but this method proved to be costly and time-consuming. In addition, the patterns distorted under the effect of heat and the fins opened up; patterns had to be scrapped after 10 to 12,000 cylinders had been cast. At present, the complete pattern is—with the exception of runners and core prints—cast in one piece in shell-moulds, with only grinding allowances. Production costs of this one-piece pattern are 70 per cent. lower as compared with the early pattern composed of separate fins. The new-type patterns retain their dimensional accuracy even after the casting of 30 to 40,000 cylinders, and costs of repair are 80 per cent. lower too. The patterns are made without allowance for contraction because of the thermal expansion during heating to 180 to 220 deg. C. and of the very restricted shrinkage of the casting.

Running and Gating

The running and gating systems employed for green-sand moulds had to be modified for shell-moulds. The main difference between the two mould types was in the friction arising between metal and runner surfaces. The liquid-metal stream loses its kinetic energy very easily because of high friction on the sand surface. Smooth walls and absence of moisture reduce this friction in a shell-mould to a minimum. Furthermore, in a green-sand mould, a layer of metal freezes first onto the walls of runners and the metal then flows through this metal "lining." The lining will only remelt when a considerable quantity of metal has passed through it. Initial solidification is much less in runners of shell-moulds because of the absence of moisture and the solidified metal remelts more rapidly because of the much reduced cooling effect of shell-moulds. The experiments of M. D. Malegin showed that spiral test pieces cast into shell-moulds were 25 to 30 per cent. longer than those cast into green-sand moulds.

The casting position of 250 and 125 cc motor-cycle cylinders was originally as shown in Figs. 1*a* and 1*b*. For the want of experience, methods developed for sand moulds had to be employed for calculating runners and gates. As shown in the photographs, this procedure had many deficiencies. Yield was low, casting inconvenient and the iron fell straight, without any filtering, into the mould,

* Abstracted from the Hungarian foundry journal *Öntöde*. The Author is a metallurgical engineer employed at the iron and steel foundries of the Csepel works, Budapest.

† It is believed that this iron has a tensile strength of 18 tons per sq. in.—EDITOR.

frequently causing rejects on account of slag inclusions. Vents were not provided on the assumption that gases would escape at the parting face. Four gates of 1.24 sq. in. total cross section were

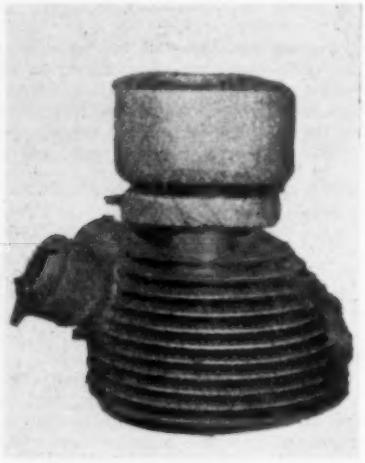


FIG. 1.—*Casting positions of* 125 (*a*) *above, and* 250 *cc* (*b*) *below, motor-cycle cylinders in the early production trials when the carrying over of green-sand practice to shell-moulding gave very poor yield and results.*

soon abandoned for two gates of 0.93 sq. in. total cross section, in the hope of eliminating the shrinkage cavities (1 in Fig. 2) that showed up in as much as 40 to 60 per cent. of castings from time to time. The cavities were usually in the same position and could not be eradicated by using chills of varying masses. Simultaneously with the reduction in cross section, the height of gates was also reduced from 0.31 to 0.2 in., since the gates had frozen up too rapidly. Although these alterations improved matters somewhat, rejects due to shrinkage cavities remained at 25 to 30 per cent. The position of cavities moved to 2 in Fig. 2.

New Method

All these time-consuming experiments showed that the reject-level could only be reduced by a thorough re-planning of casting technique. The following points were considered in developing the new technique:—1. Directional solidification should be ensured. 2. The casting position should facilitate the escape of gases developed in the mould during pouring. 3. In order to improve yield, the runner system, or parts of it, should contribute to feeding. 4. The runner-system should ensure a perfect slag-filtration.

In order to satisfy these requirements, casting in the reversed position was introduced (Fig. 3). This ensured directional solidification. The thick rim of 250 cc cylinders was now in the lowest position and this improved the uniformity in hard-

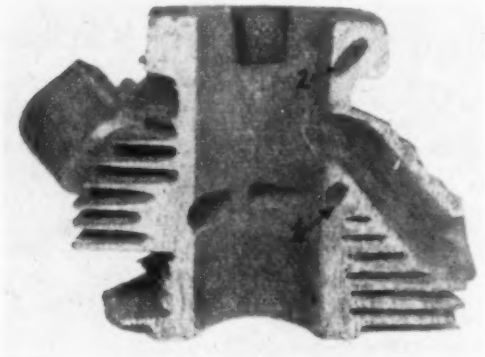


FIG. 2.—*Recurring location of persistent shrinkage cavities in the* 250 *cc cylinders that arose when applying the green-sand feeding system to shell-moulding.*

ness. The weight of runners and feeder heads was reduced by 54 per cent. in comparison with the earlier technique. Slag-free casting was achieved by tilting the section of down-gate adjacent to the mould at 60 deg.; slag impinges on the vertical part of the bottom and cannot get into the mould. The cone-feeder acts as a vent and indicates the proper filling as well. An additional reason for reversing the casting position of 125 cc cylinders (Fig. 5) was the gas porosity in the vicinity of studs. This defect first showed up when blown shells were employed instead of dumped ones. As a result of shell blowing, local accumulations of shell and core material made contact and caused gas porosity in castings poured at lower (1,350 to 1,330 deg. C.) temperatures. By reversing the casting position it became possible to shift these masses outside the actual casting into the runner

system. A similar technique has been employed for the casting of 125 cc cylinders produced for the German Democratic Republic. These outlined alterations in the running system and casting position eliminated the difficulties that had been encountered when shell-moulding was first taken

FIG. 3.—*As-cast aspect of 250 cc cylinder with completely revised method of production.*

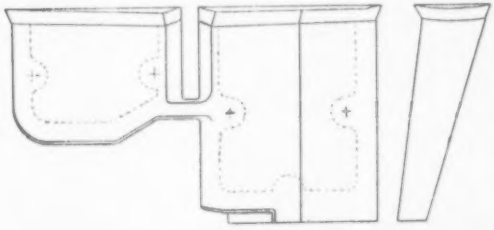


FIG. 4.—*Re-designed running system adapted to the shell-moulding technique for the cylinder shown in Fig. 3.*

up for cylinder castings (shrinkage cavities, gas porosity, leaking cylinders, great scatter in Brinell-hardness at the top and bottom of cylinders, etc.).

Specific Problems

A. Resin-bonded sand

Two, contradictory requirements must be borne in mind when choosing a resin-coated sand: (*a*) The sand should have a high permeability; (*b*) A surface free from penetration and scabbing must be ensured for good appearance. Sand of fine grading presents difficulties even in green-sand mould making, since low permeability causes gas-bubbles to form on the fins of patterns, which will be filled out by cast iron, and flash formed will

FIG. 5.—*As-cast arrangement of 125 cc cylinder that eventually enabled slag and gas porosity to be eliminated.*

join fins together. The other deficiency of fine sand shows in casting when the large amounts of gas developed cannot escape through the shell and the vents. Bubbling is observed during the pouring of such moulds, but gas porosity usually becomes visible only after machining. When sand of coarser grading is used, heavy penetration is usually observed, especially on the ribs and on the surface of large cross-sections and because of the complex shape, these cannot be removed even by grinding. Extended trials were carried out in collaboration with the Homokelökészitö Vállalat (Sand Processing Company) in order to solve this problem. The experiments led to the formulation of the H-80 quality sand that ensures acceptable surface appearance on the casting and good permeability both in mould-making and in casting. The approximate grading of this sand is:—0.3 mm grains 52 per cent., 0.2 mm grains 32 per cent., and 0.1 mm grains 16 per cent. It has been established by experiments that a max. ±15 per cent. deviation from this composition is permissible.

B. Pouring

Boxes made of 1.5 mm thick sheet are placed on a conveyor for the pouring of cylinders. One box takes four of the 250 cc moulds and five of the 125 cc ones. The space between moulds is filled with sand of four to five per cent. moisture content. If for some reason (such as the change of pouring ladle) not all moulds of one box are cast at the same time, the heat from the mould that had been cast is sufficient to induce the decomposition of resin in neighbouring moulds, accompanied by the formation of large gas volumes. Loud explosions are audible during the pouring of such moulds and out of ten 250 cc cylinders, nine were rejected for gas porosity. In order to eliminate this defect, all moulds contained in one box are cast without interruption. If this is for some reason impossible, then the gases are ignited in the empty mould before recommencing pouring.

Useful Gadget :

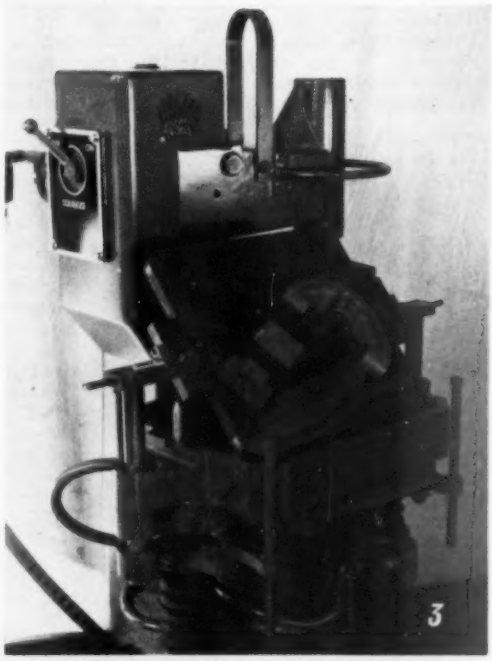
One Machine—Two Half-moulds

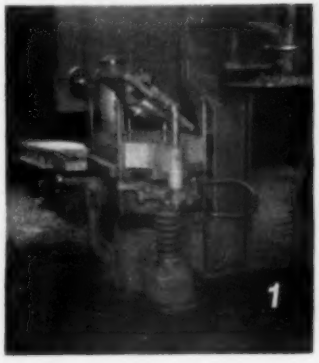
*By G. Hickman, A.M.I.B.F.**

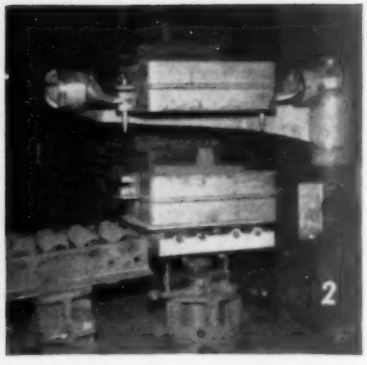
The pictures here represent moulding-machine adaptations for producing different half-moulds alternately from one moulding machine. For limited production runs, the device avoids the reservation of two moulding machines—and crews—for producing top- and bottom-half moulds simultaneously and in step with each other. For example, with the single machine equipped in the new way, complete with pattern, the production of top-half moulds, requiring, say, *x* seconds each to make, can proceed and keep pace with production of bottom-halves, needing perhaps *y* seconds each. Waiting time is thus avoided.

The illustrations show the detail of the modification and speak for themselves. Two working sequences are possible: (1) The arrangement shown in Figs. 1 and 2 makes it possible at the Author's works for one operator (on a BMM pin-lift machine) to make cope and drag half-moulds alternately, followed by transfer of the mould halves from the machine to the closing device, which, after clamping, allows a mould (total 3 cwt.) to run down a gravity roller on to the casting track without any further manual assistance.

Alternatively, for the second operational sequence, the rapid turnover attachment can be used as shown in Fig. 3. Here again, it is possible for cope- and drag-halves to be made alternately from double-sided patternplates, allowing one machine to make a complete mould—instead of one machine making copes and another drags.







* The Author, who is attached to Lee, Howl & Company, Limited, iron-founders, pump and pumping-machinery manufacturers, of Tipton, has generously submitted this contribution in response to the invitation contained in the JOURNAL'S Leading Article of December 1, 1960, for information about useful gadgets operated by readers which could be published for the general benefit of the industry.

W. H. Allen's Extensions

Work has recently commenced on a new pump test-house and a new research laboratory at the Bedford works of W. H. Allen Sons & Company, Limited. The test-house will be of single-storey, consisting of a main building with an annex on either side. The arrangements in the main section (which will contain a 30-ton crane and a large sump, 20-ft. deep by 32 ft. by 21 ft.) will provide every tension facility for the testing of pumps of capacities up to 120,000 gallons of water per minute. Each annex will be equipped with a 3-ton crane to handle the change-over of 6-ft. dia. test-pipes. The main research laboratory will comprise a two-storey office-block, providing 3,500 sq. ft. of accommodation, and an adjoining single-storey laboratory of 2,300 sq. ft.

First-aid Training Regulations

The First-aid (Standard of Training) Order, 1960, which comes into force on July 1 will require persons in charge of first-aid boxes in factories, employing more than 50 people, to reach a certain standard of training in first-aid. To explain the provisions of the Order the Ministry of Labour has issued leaflet, MOL Form 2041, in which information is also given about courses of training generally available, and the types of certificates issued by training organizations. The leaflet is obtainable from H.M. Stationery Office, price 4d.

HOLMAN BROTHERS, LIMITED, Camborne, Cornwall, have opened new western area offices at 8, King Street, Bristol.

BCIRA Research Work

The January issue of the *Journal* of the British Cast Iron Research Association contains several interesting reports, abstracts from which are printed below:—

Eutectic Structure in White Cast Iron, by J. Rickard, B.SC., A.I.M., *and I. C. H. Hughes,* M.SC., A.I.M. In this investigation the authors state that the euctectic in white cast iron may solidify with either a ledeburitc or a plate-like structure, and a study of the solidification sequences of the two types of structure has led to the following conclusions:—

(1) While the ledeburitic eutectic solidifies with only moderate undercooling and recalescence, the plate-like eutectic solidification occurs very rapidly with considerable recalescence after undercooling by about 20 deg. C. more than the ledeburitic.

(2) The ledeburitic eutectic occurs more readily than the plate-like eutectic and is nucleated at points on the interface of the iron with the mould. It is promoted by siliceous refractories, though not by recrystallized alumina, and by additions of a wide range of elements to the liquid iron.

(3) The plate-like eutectic occurs when nucleation of the ledeburitic eutectic is avoided. It is promoted by super-heating the iron and by melting and solidification in recrystalized alumina refractories. It is nucleated at numerous points throughout the melt without any preference for the mould/metal interface.

(4) The ledeburitic eutectic solidifies progressively during the eutectic arrest in the form of clusters of elongated crystals which grow from the edge towards the centre of the sample. Each cluster represents a relatively large eutectic cell.

(5) The plate-like eutectic solidifies about a number of centres throughout the iron in a non-directional manner, to produce equiaxed crystals which constitute relatively small eutectic cells.

(6) In each type of structure, the first phase of the eutectic to be nucleated is cementite in plate form. The ledeburitic eutectic develops by the sideways growth of austenite and cementite, while in the plate-like eutectic this sideways growth is replaced by the growth of additional plates separated by austenite.

Acid-lined Cold-blast Cupola Performance—Effect of Tuyere Size and Determination of the Optimum Operating Condition, by H. J. Leyshon, B.SC., *and R. B. Coates,* B.SC. The authors summarize the purpose and results of their work as follow: The BCIRA experimental cupola has been used to investigate the effect of tuyere ratio on acid-lined cold-blast cupola performance and to attempt to establish a sound basis for efficient cupola operation. In this investigation, carried out under carefully controlled conditions, tuyere ratios from 1:53 to 1:2.6, and blast rates from 1,200 to 2,400 cu. ft. per min. were used in a cupola of 29-in. internal diameter.

It was found that for a constant coke-charge:metal ratio, tuyere ratio had no effect on cupola performance. Melting rate was a linear function of blast rate and increases in blast rate had no effect on the silicon, manganese, sulphur and phosphorus contents of the metal produced, but metal temperature and carbon content rose to maximum values after which further increases in blast rate reversed the trend. The maximum metal temperature and carbon pick-up were attained at a specific blast rate of 440 cu. ft. per sq. ft. per min. which produced a specific melting rate of 0.9 ton per sq. ft. per hr. It is concluded, after comparing the results with those of other workers, that the widely used design melting rate of 0.75 ton per sq. ft. per hr. is satisfactory but this rate may be increased provided that the coke:metal ratio does not necessitate a blast rate in excess of 440 cu. ft. per sq. ft. per min.

Influence of Cold-blast Cupola Practice on Casting Properties and Iron Composition, by K. E. L. Nicholas. The behaviours of the test castings employed in this investigation were representative of many commercial castings, especially those of light section. Although only one type of iron was used the effects of metal composition and degree of eutectic nucleation on casting properties are likely to be true for most hypo-eutectic grey irons produced by cold-blast cupola melting. The conclusions drawn from the series of nine melts are:—

(1) Casting properties, metal composition and degree of eutectic nucleation are unaffected by variations in tuyere diameter but are related to blast rate. Carbon equivalent, total carbon and silicon contents reach maxima at specific blast rates between 370 and 440 cu. ft. per sq. ft. per min. and are related to low chill and minimum shrinkage, tensile strength and Brinell hardness. The degree of eutectic nucleation of the iron decreases with increase in blast rate.

(2) Shrinkage unsoundness becomes more severe as the carbon equivalent and carbon contents of the iron decrease.

(3) Chill depth increases as the carbon equivalent and silicon contents decrease; chill also becomes severe as the degree of nucleation of the iron decreases.

(4) Tensile strength and hardness increase as the composition becomes increasingly hypo-eutectic. Hardness significantly increases with fall in total carbon content.

(5) In chill plates and plate-with-boss castings, the degree of eutectic nucleation of the iron increases as the composition approaches eutectic. Carbon and silicon contents independently increase the degree of nucleation.

Hard-chrome Plating of Cast Iron, by T. J. Glover. The possibility that the difficulty experienced in depositing a continuous coating of chrome plate on iron castings arises from variation in microstructure and graphite form and distribution was the concern of Mr. Glover in this investigation. Samples of cast iron of various compositions, microstructures and surface finishes were immersed in a commercial chrome plating vat; current densities used covered the normal commercial range. Continuity and thickness of plating were determined on microsections. Results showed that surface finish is a very important factor in ease of plating cast iron; size and distribution of flake graphite appear to have little effect and matrix structure none at all. Nodular-graphite irons can be plated at lower current densities than flake-graphite irons; a high-phosphorus content leads to difficulty in plating.

Quantitative Analysis of Quartz in Foundry Dust of Respirable Size by X-ray Diffraction, by R. I. Higgins and P. Dewell. In this report a procedure is described for the routine analysis of quartz in foundry dust of respirable size. The method is based on the use of a 57.3-mm. dia. microfocus powder camera. Calcium fluoride is employed as internal standard. The accuracy of the analysis is affected by the following factors:—(*a*) reproducibility, (*b*) particle size of quartz, (*c*) line co-incidences due to graphite and mica. These factors are discussed and it is concluded that the major error in the method is due to lack of reproducibility which probably arises from inhomogeneity of the mixture of dust sample and internal standard.

BCIRA Research Work

Inoculation and Casting Expansion, by K. E. L. Nicholas. The author draws the following conclusions from his research. (1) Irons of high degree of eutectic nucleation, as obtained by inoculation, have a larger overall casting solidification expansion than irons of the same composition, poured at the same temperature, but of lower degree of nucleation. (2) The increased casting expansion of irons of high degree of nucleation is associated with more-severe surface-shrinkage and internal porosity. (3) Differences in the degree of nucleation influence casting expansion and associated unsoundness over a considerable range of phosphorus contents. (4) Variations in degree of nucleation have a greater influence and unsoundness in thin- and medium-section castings than in heavy-section castings.

American Letter

1961 Forecast

1961 predictions in the US are subdued and solemn partly because those made a year ago fell far short of the promise. Politically, a new team moves into government and while many of its functions and obligations do not lend themselves to the "magic" of political optimism, there may be changes in methods for dealing with current problems—pleasant or painful depending upon how the country reacts to the blend of administrative and legislative decrees. With the "ship of state" listing a little to the right, and an administration loading it cheerfully to the left, it becomes imperative for statesmen in labour, business and politics to maintain a reasonable balance.

Looking Back

Statistically, 1960 in US was not a poor year. More consumer goods were moved than in 1959; a million more motor-cars were made and sold, more dollars changed hands (albeit with some inflationary padding) and personal income held its ground. During the last half of 1960, the forerunners of recession were beginning to cloud the future; there was less construction, less home building, reduced capital expenditure, borrowing, and business indebtedness, less expansion, more unemployment, shorter working-time, shrinking inventories, less-exhuberant spending, along with an alerted management conscious of the necessity to curb extravagant outgoings.

Looking Forward

Any governmental accelerators to business progress will take six months to become effective and improvement is expected in any case within that time! Strangely enough the automobile industry, an index of consumer spending, is planning a lower rate of output for 1961. A rise is expected in construction, agricultural, railway, machine-tool and metal-working equipment, representing in large measure repair, maintenance and replacement of equipment.

In the expected revival, the foundry industry should fare as well in 1961 as in 1960 and the more hopeful forecasters predict an upswing of 10 per cent. over 1960. Especially favoured are the aluminium and zinc pressure-die-casters, the steel, malleable and s.g.-iron producers. (The US foundry industry during 1960 just about equalled its 1959 output.)

Spheroidal-graphite Iron *versus* **Aluminium**

In an article published in the December, 1960, issue of *American Metal Market*, it is predicted that spheroidal-graphite iron might soon be "battling" with aluminium and grey iron for making automobile engine-blocks and that, in addition, it is finding applications for other motor-car components.

For example, it is reported that the US Ford Motor Company is experimenting with cylinder-blocks made of s.-g. iron and will use an s.-g. iron engine on at least one of their 1962 models. Mr. James H. Lansing, executive secretary of the Ductile Iron Society (of America), claims that all major US motor-car manufacturers are experimenting with this material and that the weight saving when using s.-g. iron is about half that of aluminium, but that cylinder-blocks made with this material would cut manufacturing costs. Mr. Lansing also noted that the cost of s.-g. iron cylinder-blocks might be only half as much as those of aluminium engines which required ferrous inserts and liners. Another advantage of the use of s.-g. iron put forward was that it required a minimum of machining and would need no new investment in machine-tools by the automobile industry.

Ford cars now had crankshafts and rocker arms of s.-g. iron; previously crankshafts were steel forgings, it was reported. However, the article points out that estimates vary on the comparative costs of s.-g. iron and grey iron. One US foundry expert thought the reduction in weight would offset the higher cost, *i.e.*, an s.-g. iron cylinder-block weighing 130 lb. cost about the same as a cast-iron block weighing 200 lb.

Statistics:

S.-g. iron, developed about 10 years' ago, was being produced by about 200 foundries in the US the report continued, and production up to September 1, 1960 (8 months) was given as 107,000 tons and the estimated production for 1960 at 161,000 tons. World production for 1960 will be about 535,000 tons.

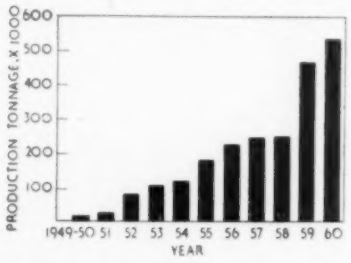


FIG. 1.—*World production of spheroidal-graphite cast iron (including that of Russia, Europe, Asia, Africa and the Americas).*

Mr. Lansing said that the consumption of s.-g. iron in the US was estimated at about 134,000 tons per year. However, if the material became adopted by the automobile industry, this figure could easily be tripled, and reach 1,000,000 tons quite quickly.

One leading exponent of aluminium said that when motor-car manufacturers decided to use a material for a new application, they were not likely to suddenly shift away from it after much thorough technical work had been carried out. Last year had seen the first aluminium engine, yet the central foundry division of General Motors had recently publicized the completion of the 100,000th. Pontiac-Oldsmobile aluminium engine and the 200,000th cylinder-head of aluminium. The development of a motor-car engine was complicated and required the longest "lead" time of any motor-car component. For example, sometimes a switch of material or design required seven years' of research.

Notes from the Branches

South Africa

Extensive air-pollution legislation is now being formulated in South Africa following generally the pattern of American and British practice, it was stated by Mr. R. D. Wright, the lecturer at a recent meeting of the South African branch of the Institute of British Foundrymen, under the chairmanship of Mr. J. Peers.

The author also said it was likely that the factory inspectors of the Department of Labour would be invested with wide powers for the prevention and elimination of dust in foundries and in all other industries where dust could be injurious to health.

Referring to dust-collection equipment, he said this must be as efficient as the available capital for its installation could allow. The collector selected should allow the least possible amount of contaminant to escape and still be reasonable in the first cost and maintenance. In some applications, however, considerations of cost and maintenance would have to be sacrificed to meet established standards of air pollution control, or to allow for standards that may be legislated for in the future.

Although the benefits of health protection were not directly shown on a foundry's balance-sheet, Mr. Wright said employers should be vitally interested in the subject since each employee represented an investment in money and time which industry could not afford to ignore. Good working conditions improved production, reduced scrap and made for better labour-management relations within the foundry.

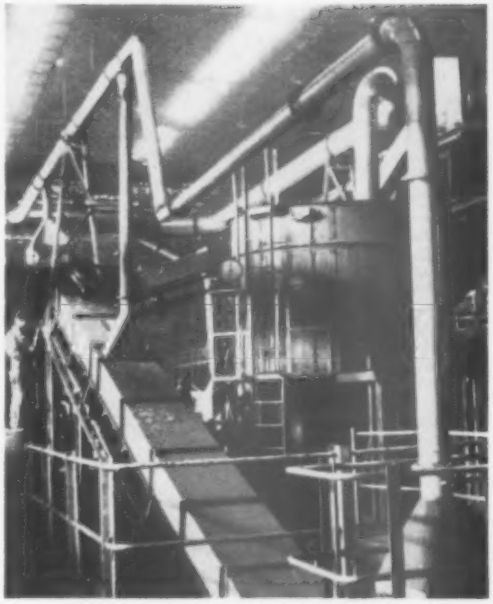
Assessment of Danger

The assessment of the danger of pneumoconiosis and silicosis in foundry environments was obtained by measurements of dust concentrations such as those regularly carried out in South African gold mines. It must be appreciated, however, said the author, that atmospheric conditions in any foundry varied with the time of day, season of the year, weather, the work shift and the processes operating at a particular time. No empirical standard of engineering practicability for accurate testing could be suggested unless the tests were carried out over a period at different times in the day.

There were no regulations in South Africa limiting the use of free silica flour and suppliers of foundry materials did not limit voluntarily or by regulation the free silica in their raw materials. Certain foundries in South Africa had proved there was a tendency, whether using shot or sand in blasting rooms, for the personnel eventually to contract silicosis.

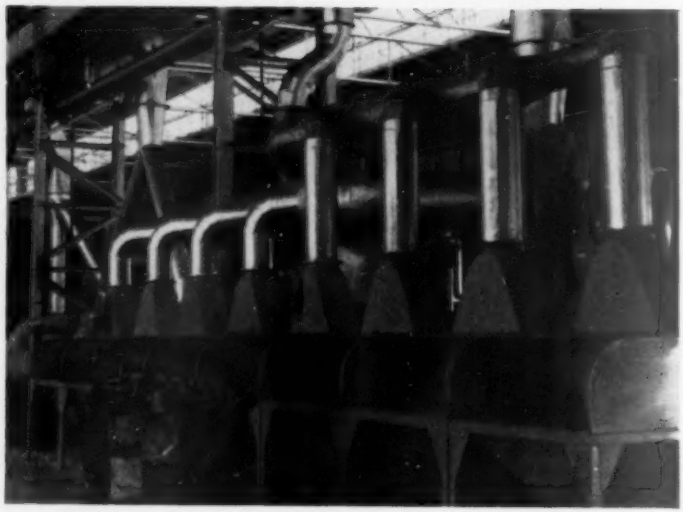
Personal Protection

Under this heading, the author described the application of adequate mask control which permitted the operator wearing the mask to breathe through a type of filter media which ensured that the air reaching his breathing zone was clean. Employees, he said, readily used personal respiratory protective devices where discomforting or intolerable conditions were encountered during the operations, or in situations that were known to them and could be proved to cause immediate harm. Where the harmful atmosphere, however, was only mildly discomforting, difficulty was experienced in persuading people to wear respirators. If compelled to wear them they would do so only under strict and close supervision.



Sand-handling plant in a fully mechanized cast iron foundry. The complex ducting and hooding is partly shown, exhaust being by means of a heavy-duty wet-collector, not illustrated.

Shakeout in an iron foundry; to the right of the specially-designed exhaust hood is the combined dust-collector unit.



Fettling benches in a non-ferrous foundry, where complete dust-control is achieved by means of a down-draught exhaust system from the benches themselves.

Foundry Ventilation

Mr. Wright went on to say that general conditions in the foundry could be improved by ventilation, but this required an extensive and often very expensive installation which would only increase air movement and by so doing improve by dilution the ambient conditions inside the foundry. Ventilation systems often relied on static-type roof ventilators but as the air flow depended on the direction of wind and temperature differential between the inside and outside atmospheres, these factors made such ventilation methods unreliable and changeable as they varied between wide limits.

Where each piece of equipment was handled by an individual, localized dust collector this was an efficient method of collecting dust-laden air close to dust sources produced by operations such as grinding. With increased mechanization taking place in sand preparation and moulding, the problem of the control of dust clouds released—particularly in the handling of sand in its dry state—became easier, and followed pre-defined paths laid down by the conveyor runs involved in the sand-preparation plant.

The author discussed a new system of dust control called low-volume high-velocity exhaust and showed a film in which the method was successfully used for portable tools. A second film shown was entitled "Design of Exhaust Hoods."

Mr. Wright concluded the lecture with a word of warning. He said that the time was not far distant when South African foundries might be faced with a large-scale labour shortage in the operations which were now using non-white labour. It was essential, therefore, that working conditions in foundries should be made no less acceptable than those in other industrial employment. As the labourer became more aware of welfare and basic industrial hygiene, the attention paid to his working conditions in the foundry industry would pay dividends.

The discussion was opened by a written contribution from Mr. J. H. G. Loubser, of the South African Railways, who complimented the author on a forthright presentation of a vital subject. The proceedings concluded with a hearty vote of thanks proposed by a Council member, Mr. A. B. Anderson.

Hadfields' Interests in Canada

Hadfields, Limited, of Sheffield, announce that, effective February 1, 1961, H.M.K. Sales, Limited (formerly Millspaugh (Canada), Limited) will control and promote the marketing in Canada of all products of the Hadfields group of industrial companies. The group includes Millspaugh, Limited, of Sheffield, The William Kennedy & Sons, Limited, Owen Sound, Ontario, and other companies in the Hadfields and Millspaugh groups. The head office of H.M.K. Sales will be located at 3285 Cavendish Boulevard, Montreal, and regional offices will be maintained in Montreal, Toronto, Owen Sound and Vancouver. Until such time as H.M.K. Sales can assume full control, Peacock Brothers, Limited, who formerly directed sales of Hadfields products in Canada, will assist in the changeover.

Appointments announced (effective from December 1, 1960) are those of Mr. John van Hemert, of Montreal, who has been appointed vice-president and managing director of H.M.K. Sales; Mr. J. C. Stavert, has been appointed vice-president, production, of The William Kennedy & Sons, Limited; Mr. R. C. Heys, director, Hadfields, Limited, and managing director, Millspaugh, Limited, becomes president of H.M.K. Sales and Mr. H. M. Smith (of Owen Sound) president of The William Kennedy & Sons.

French Foundry Industry

L'Usine, the French industrial magazine, reports that unattached iron foundries in France produced 10 per cent. more castings in 1960 than in 1959, but 10 per cent. less than in 1958. Pressure-resisting castings showed an increase of 25 per cent. on the previous year, but in 1959 there were signs of a "slump." Prospects for 1961 are stated to be good. Trade in gas-fired heaters and cookers is expanding but decreasing in solid-fuel-fired apparatus. The jobbing shops show an increase of about seven per cent. over 1959, monthly production running between 40,500 and 43,000 *tonnes;* the new year opened with favourable order books. Malleable foundries had a good year in 1960, and increasing use of the pearlitic variety makes prospects for 1961 favourable.

Production of copper-base castings increased by eight per cent. in 1960 over 1959 and prospects for spring this year show no change. Light-alloy production gained nine per cent. in 1960, but a recession is expected in demand for automobile castings. The demand for castings in other branches of engineering gives hope that 1961 production will nearly reach that of 1960.

Pressure-die-casting production increased during the year by about 10 per cent. and because of the tendency of these castings to replace both gravity-die and sand-cast components, the prospects are favourable.

Dinner

FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION

Last Friday, the Foundry Trades' Equipment and Supplies Association held its annual dinner at the Savoy Hotel, London, under the presidency of Mr. W. E. Aske. Over 200 members and guests attended —an all-time record. Mr. N. P. Newman, C.B.E., J.P., chairman of the Joint Iron Council, proposed the toast to the Association, and Mr. Aske replied: "The Guests" were proposed by Mr. F. Barrington Hooper and Mr. G. R. Shotton, president of the Institute of British Foundrymen, responded.

During his speech, Mr. Newman referred to the fact that the foundry industry of this country had virtually sufficient funds to complete the re-building of the National Foundry Craft Training Centre, but more equipment was still required. There was a need, he said, for the Government to arrange better insurance of export risks, and for exporters to cater for overseas market needs with publicity in the appropriate languages. It should be realized that it was vital for manufacturers to service the export trade even at the expense of the home market. This matter of the urgent need for exports was further stressed by Mr. Aske during his remarks. He said the time for "talk" was past, it was now deeds that mattered. He also dealt with the need for increased research of all types and also the requirement of greatly augmented educational facilities both of broadly based and technological types. Supplementing Mr. Newman's remarks about the National Foundry Craft Centre, he thought that members of the FTE&SA could possibly do still more in providing funds.

In proposing the toast to the guests, Mr. Hooper referred to the pleasure it gave to the Association to have so many distinguished people from the foundry industry with them at the dinner, and mentioned a number of them by name. Those present among the guests included Mr. M. J. Glenny, chairman, Council of Ironfoundry Associations; Mr. A. J. N. Brown, president, Association of Bronze & Brass Founders; Mr. J. M. Thomson, DSIR; Mr. K. Marshall, director, Joint Iron Council; Mr. E. C. Rowen, president, National Society of Master Patternmakers; Mr. G. Lambert, secretary, Institute of British Foundrymen; Mr. J. Bolton, director and secretary, British Steel Founders' Association; Mr. J. W. Butler, assistant director, Council of Ironfoundry Associations; Mr. D. A. C. Hutchison, IBF London branch president; Mr. G. L. Bailey; Mr. H. Morrogh, and Dr. A. H. Sully, directors respectively of the British Non-Ferrous, Cast Iron, and Steel Castings Research Associations, and Mr. G. K. Timperley, secretary, Silica & Moulding Sands Association.

Artistes in the cabaret show after the dinner were Pamela Cundell, Les Henning and Kathleen O'Hagan.

ENGLISH STEEL CORPORATION, LIMITED, together with subsidiaries Taylor Bros. & Company, Limited, the Darlington Forge, Limited, and its associated company, Firth-Vickers Stainless Steels, Limited, will be exhibiting on one large group stand (No. 56) at the Leipzig Spring Fair opening on March 5. Exhibits will include carbon and alloy steels and tool steels, automatic couplers, engineers' cutting tools and permanent magnets. Photographs will illustrate the company's larger products such as large castings for rolling-mill housings and one-piece cast-steel railway-bogies. Shell-moulded and static castings will also be featured.

Institute of Metals

The Institute of Metals is holding its Spring Meeting in London from March 21 to 23 at Church House, Great Smith Street, London, S.W.1. On the first morning, during the annual general meeting, commencing at 10.10 a.m., Professor H. O'Neill, M.MET., D.SC., F.I.M., will be installed as president and deliver his address; this will be followed by the presentation of awards. In the evening at 6.30 p.m., Professor M. Polanyi, D.SC., F.R.S., the May lecturer, will be giving an address on "Science: Academic and Industrial." On the Wednesday evening at 17, Belgrave Square, London, S.W.1, there is to be a conversazione and exhibition, whilst on Friday evening the annual dinner/dance is to be held in the Ballroom, Grosvenor House, Park Lane, London, W.1. About a dozen papers which are being presented and discussed are listed in the programme. Details of all the events can be obtained by writing to the secretary of the Institute, at its headquarters in Belgrave Square.

Electrical Engineers Exhibition

The Minister of State, Board of Trade, the Rt. Hon. Frederick J. Erroll, is to open the Electrical Engineers Exhibition, at Earls Court, London, on March 21. It is expected that the number of exhibitors—over 470—will constitute a record. (The Exhibition closes on March 25.) Among a wide variety of electrical applications the following items of particular interest to readers are a vertical-spindle motor generator with an output of 10,000 c/s for furnace work; an arrangement of spray taps in conjunction with electric water-heaters; low-temperature environmental testing cabinet for exposing components to temperatures from 150 to 70 deg. C.; an illuminated push-button industrial-timing relay for heavy duty; a variable speed reversible a.c. motor and an automatic thickness comparator. The sponsors of the Exhibition, the Association of Supervising Electrical Engineers, will have an information stand on the first floor.

Society of Die Casting Engineers

The Society of Die Casting Engineers, 19382, James Couzens Highway, Detroit 35, Michigan, has elected Mr. John L. MacLaren (Aluminium, Limited, Sales, Inc., New York) as president for 1961. Mr. Earle W. Rearwin (Die Casting Machines, Reed-Prentice Division, Package Machinery Company, Mass.) becomes vice-president, Mr. M. R. Tenenbaum (Lester-Phoenix Inc., Cleveland, Ohio), secretary, and Mr. Lee G. Axford (Ford Motor Company, Detroit), treasurer.

Mr. MacLaren reports that during 1960 the Society experienced a 60 per cent. growth in membership, and plans are under way to expand the number of chapters in SDCE. During the year the Society sponsored the First National Die Casting Exposition and Congress and at the latter the increasing interest in die-casting techniques was emphasised in the 31 papers presented. The Society is planning to sponsor another exposition and congress in 1962.

Latest Foundry Statistics

Light-alloy Castings: The Ministry of Aviation in a Press release announce that production of aluminium castings in November amounted to 8,748 tons made up of 1,810 tons from sand moulds, 4,808 tons of gravity-die and 2,130 tons as pressure-die-castings. As forecast by the JOURNAL, the year's production will top the 100,000-ton mark. The month's output of magnesium castings was 216 tons, with the 11 months' total reaching 2,029 tons.

News in Brief

THERE WERE 900 GUESTS at the annual staff ball of Thos. W. Ward, Limited, Sheffield, held at the Cutlers' Hall on February 17.

FIVE OF THE BELLS of St. Paul's Cathedral, London, are being sent to the bell foundry of John Taylor & Company, Loughborough, for new ball-bearings to be fitted to the mountings.

THE SUDANESE MINISTRY OF COMMUNICATIONS is reported to have ordered 10 diesel locomotives from the English Electric Company, Limited, to be delivered before the end of this year.

AT THE DAILY MAIL IDEAL HOME EXHIBITION being held at Olympia, March 7 to April 3, Sidney Flavell & Company, Limited, Leamington, will be showing their new model gas cooker known as the "Envoy Automatic."

THE GRIFFIN AND GEORGE GROUP announce the opening of a new sales centre at Bristol under the management of Mr. W. J. Smith. Enquiries, etc., should be addressed to Griffin & George (Sales), Limited, Clothier Road, Brislington Trading Estate, Bristol 4.

SHEFFIELD HOUSING MANAGEMENT COMMITTEE has recommended that a contract be entered into with Coldair, Limited, for the supply and delivery of refrigerators (three cu. ft. capacity), at the price of £33 2s. 6d. each, up to a maximum of 7,000 during the year ending March 31, 1962.

GIRLING, LIMITED, Birmingham, is to build a plant in Coblenz, West Germany, with an investment of 25,000,000 marks (just over £2,000,000) to produce brakes for delivery on the European continent. The plant is due to begin production at the end of next year with an initial staff of about 250.

FURTHER ORDERS for Leyland trucks and a substantial quantity of spares have been placed by Technoimport of Bucharest, on behalf of the Rumanian Ministry of l'Industrie Lourde, with Leyland Motors, Limited. Total value of contracts obtained this year from Rumania by the company now exceeds £230,000.

THE RHODESIAN IRON & STEEL COMPANY'S new blast-furnace was brought into use for the first time on February 9. The furnace—at Que Que, and costing nearly £2,000,000—is part of a £10,000,000 expansion plan. It is estimated that the plant will produce about 300,000 tons of iron this year, as against 105,000 tons last year.

PEGLERS, LIMITED, the Doncaster firm of brass-founders, have launched a private pensions scheme for their employees which more than 95 per cent. of their shop-floor personnel have joined. Although membership is voluntary at present, new employees and present employees under 21, will be required to enter the scheme as and when they are eligible.

OVER 100 FOREMEN AND FOREWOMEN from a cross-section of industry met in Scarborough over the week-end of February 18 for a conference organized by the Industrial Welfare Society. There were also observers from the Philippines, Malaya, Ceylon, Thailand, Brazil and Jamaica, who are in this country studying industrial relations under the auspices of the British Council.

Sir STUART GOODWIN, the Sheffield industrialist, and Lady Goodwin, have given their Sheffield home, Langhill, Manchester Road, to the United Sheffield Hospitals. It links up with three other properties already owned by the hospitals, one of which, Kersal Mount, was a previous gift from Sir Stuart. Langhill has 10 bedrooms, four bathrooms, and is equipped with oil-fired central heating.

AN INTERNATIONAL SYMPOSIUM on criticality control in chemical and metallurgical plant, organized by the OEEC European Nuclear Energy Agency in collaboration with Kernreaktor Bau-und Betriebsgesellschaft m.b.H., is to be held from May 2 to 5, at the Karlsruhe Nuclear Research Centre in Germany. Further information may be obtained from the OEEC European Nuclear Energy Agency 38, Boulevard Suchet, Paris, 16.

MOND NICKEL COMPANY, LIMITED, an affiliate of the International Nickel Company of Canada, Limited, has changed its name to International Nickel Company (Mond), Limited. No change is involved in the company's organization or in its business activities. The board considers that the new name will serve to identify the company more closely with the Canadian company and the United States affiliate, International Nickel Company, Inc.

UNITED STEEL COMPANIES, LIMITED, Sheffield, with a donation of £10,000 head the list of responses to the King George's Jubilee Trust Appeal which is being supported by civic authorities throughout Yorkshire. Other firms on the list are Dorman Long & Company, Limited, £2,450; Davy & United Engineering Company, Limited, Sheffield, £1,200; Hargreaves (Leeds), Limited, £1,000; and Thomas Firth & John Brown, Limited, Sheffield, £1,000.

MEMBER-FIRMS of the Traders Road Transport Association are being urged to institute a regular system of inspection and maintenance of vehicles in order to reduce the nuisance of diesel-smoke emission. The national secretary, Mr. H. R. Featherstone, says that whilst the majority of vehicles are blameless in this respect, there are a few whose owners should take action immediately to prevent road transport from getting a bad name.

ALLIED IRONFOUNDERS, LIMITED, are to hold their second national annual AI merchants conference on Monday, March 6, and over 400 directors from leading builders' merchants are expected to attend. After a morning preview of Allied's "Beauty in the Bathroom" feature exhibit at the Ideal Home Exhibition, the guests will be taken to "The Talk of the Town" in London's West End for luncheon and the conference will be in the afternoon.

Mr. D. C. HANEY, managing director of International Harvester Company of Great Britain, Limited, speaking at the luncheon given by the company at the Midland Hotel, Bradford, to celebrate its 21st anniversary of establishment in Yorkshire, said that 60 per cent. of the tractors imported by the US and Canada last year came from the Bradford works of the company. Over 60,000 tractors had been produced in Bradford since 1956. The payroll, now totalling 1,356, had at one time been as high as 2,015.

AN IMPRESSIVE DISPLAY of British stainless-steel products, ranging from cuff-links to cookers, will be on show to the public at the Mayfaria Rooms, Marble Arch, London, W.1, from March 8 to May 4. The exhibition, sponsored by the Stainless Steel Manufacturers' Association of Great Britain, will be opened by Mr. Paul Reilly, director of the Council of Industrial Design. Over 200 companies have lent products for display. Admission to the exhibition is free and times of opening are 10.30 a.m. to 6 p.m.

BRONX ENGINEERING COMPANY, LIMITED, Stourbridge, has received an order from the J. B. Beard Company, of Louisiana, USA, for a set of pinch-pyramid plate-bending rolls weighing 120 tons and capable of cold rolling mild-steel plate 12-ft. wide by 3¼-in. thick at a speed of 18-ft. per min. Bronx are believed to be

News in Brief

the first British firm to obtain an order from the USA for this type of equipment. Negotiations are in progress for Bronx special purpose machinery for the steel and aluminium industries to be manufactured under licence in the USA.

Mr. T. L. KENDALL, sales director of Ruston & Hornsby, Limited, engineers, Lincoln, who was recently appointed director of special assignments, left on his first special assignment on February 14 with a party bound for Warsaw. The party, organized by the London Chamber of Commerce representing a cross section of Britain's industry and commerce, is visiting Poland on a goodwill mission. Scheduled to last about a fortnight, the trip is to gain knowledge of the Polish economy and requirements of the market and indicate the interest of British businessmen in Poland.

VILLIERS ENGINEERING COMPANY, LIMITED, Wolverhampton, announced on February 23 that the company is beginning production of a new range of aluminium engines at its Marston Road plant. Production of a 50 cc. all-aluminium industrial engine has already begun, and the machine-shop is being equipped for a range of such engines up to 150 cc. It is claimed that the aluminium engines will be cheaper to produce than cast-iron engines; the present range of engines will be continued. The scheme is part of a £2,000,000 four-year expansion programme begun last April.

MOULDERS STOPPED WORK at the Chapeltown works of Greenside Foundry Company, Limited, on February 15 after the dismissal of six men who for the past few years have been preparing sand for the moulders. The firm decided to make the six men redundant as an economy measure. The moulders declared they could not work because the necessary job of preparing sand was not their responsibility. They contended the situation constituted a lock-out. The moulders rejected a management proposal that they should continue work, preparing the sand themselves. The strikers returned to work on Monday, February 20, after being advised to do so by their union.

A WARNING of the growing threat to British trade from Russia was given by Sir James R. H. Hutchison, president of the British Chambers of Commerce, at the annual dinner of the Rotherham Chamber of Commerce on February 15. He said that of the many disturbances in the world, all affecting UK trade, the biggest threat would come from that country. Referring to a visit to Switzerland he said that whilst the Swiss seemed to have a high regard for the quality of British goods, some small points, such as marking measurements in the British rule of feet and inches and gallons and pints instead of the accepted Swiss measurements, caused them some annoyance.

Obituary

The death has occurred at the age of 73 of Mr. F. BATTYE, a director and secretary of W. W. Battye & Sons, Limited, Victoria Ironworks, Huddersfield.

Mr. FREDERICK COLLEY, an engineering foreman at the works of Sheepbridge Stokes, Limited, Derbyshire, died while at work on February 15. He was 48.

The death occurred on February 9 at the age of 69 of Mr. C. E. H. BALDWIN, formerly for 40 years a director of Kendall & Gent, Limited, machine-tool makers, Gorton, Manchester.

The death has occurred at the age of 76 of Mr. THOMAS ALFRED WILKINSON, works manager, chief engineer and a director of the Lancashire Steel Manufacturing Company, Limited, and of Pearson and Knowles Engineering Company, Limited, Warrington.

The death occurred on Thursday of last week of Mr. G. A. BAMFORD, manager, Sundry Equipment Manufacturers, Limited, London, at the age of 54. Of the 12 years with the group, Mr. Bamford spent the first six at the Morris Singer art foundry. He fas a member of the London branch of the Institute of British Foundrymen.

The death of Mr. VICENTE AGUIRRE GONZALEZ is announced from Madrid. He was founder and proprietor of the Spanish foundry journal, *Fundicion*. In his early days, Mr. Aguirre worked in the foundry of Bonvillain and Ronceray of Paris, and this background enabled him to give to his *Journal* a much more practical appeal than is usual with the majority of continental foundry papers. He will be greatly missed by not only Spanish foundrymen, but by all who had the privilege of meeting him personally.

The eminent metallurgist and industrialist, Sir ARTHUR JOHN GRIFFITHS SMOUT died last week at the age of 72. He was educated at King Edward's School, Birmingham, and Birmingham Technical College, from where in 1905 he joined the Elliot group of metal companies as a student apprentice. For four years from 1920 he was works manager of Elliot's Metal Company, Limited, and from 1924 to 1934 he was production director to the Elliot Group, Limited, which was later merged into Imperial Chemical Industries, Limited. Sir Arthur became managing director in 1934 and was chairman from 1934 to 1942 of what is now the metals division of ICI. He was appointed to the main board of ICI in 1944 with responsibility for the company's metal and ammunition interests. In 1953, he was appointed chairman of Murex, Limited, and Murex Welding Processes, Limited. Sir Arthur devoted much time and counsel to the advancement of science in industry. He was a Fellow and former president of the Institute of Chemistry and the Institution of Metallurgists, and was a vice-president of the Institution of Mining and Metallurgy. He was knighted in 1946.

Recent Wills

ASQUITH, W. S., a former director and a son of the founder of William Asquith, Limited, member of the Asquith Machine Tool Corporation, Limited, Halifax £115,922

NICHOLLS, V. L., managing director of Grazebrook Foundry, Limited, and a director of M. & W. Grazebrook, Limited, heavy general and chemical engineers, both of Dudley (Worcs) £94,364

BARRIE, GEORGE, former chairman of Barclay, Curle & Company, Limited, shipbuilders, repairers, and engineers, of Glasgow and a past president of the Shipbuilding Employers' Federation £15,887

HETHERINGTON, A. L., former assistant secretary of the Department of Scientific and Industrial Research and administrative adviser to the British Coal Utilisation Research Association ... £39,667

PARKER, WILLIAM ERNEST, founder director of British Rolling Mills, Limited, Tipton (Staffs), and a former director of Audley Engineering Company, Limited, valve makers, of Newport (Salop) ... £50,180

WEIR, SIR CECIL MCALPINE, head of the United Kingdom Delegation to the High Authority of the European Coal and Steel Community, 1952-55, and chairman of International Computers & Tabulators, Limited £36,687

MAWLE, E. E., chairman and managing director of the Meadow Foundry Company, Limited, engineers and ironfounders, of Mansfield (Notts) £50,867

WEEKS, LT.-GEN. LORD, former chairman of Vickers, Limited, and of the Finance Corporation for Industry, and a director of a number of companies £84,110

CHALMERS, ROBERT ARTHUR, at one time managing director of Tecalemit, Limited, lubrication, hydraulic and filtration engineers, of Brentford (Middx) £73,897

Personal

Presentation of an inscribed clock has been made to Mr. THOMAS SLATER on his retirement from Parker Foundry (1929), Limited, Derby, after 50 years' service.

Mr. ALEXANDER McKELLAR has joined the board of Bruce Peebles & Company, Limited. He is president of the Institute of Chartered Accountants of Scotland.

Mr. P. M. THOMAS, managing director of William Beardmore & Company, Limited, has been elected chairman of the Scottish Council of the Federation of British Industries.

Mr. J. W. HAIG-FERGUSON has been appointed managing director of R. & J. Beck, Limited, 66-71, Mortimer Street, London, W.1, one of the Griffin & George group of companies.

Mr. E. JOYCE and Mr. CHARLES PRATT, directors of Blackstone & Company, Limited, diesel-engine manufacturers, Stamford, Lincolnshire, will retire from the board at the end of this month.

Mr. JOHN MAXWELL RANKIN, Coatbridge, has been appointed superintendent of the new hydraulics assembly plant to be set up at Glenrothes, Fife, by the Cessna Aircraft Company, of Kansas.

Mr. D. L. CAMPBELL has resigned from the board of Campbell, Gifford & Morton, Limited, consulting engineers, on his appointment as managing director of Davy-Ashmore Export Company, Limited.

Mr. P. J. DAGLISH, who for some months has been a special executive of D. Napier & Son, Limited, aero- and marine-engine manufacturers, The Vale, Acton, London, has been appointed commercial director.

The Rev. BILL MATTHEWS, of the Sheffield Industrial Mission, who has been attached to the English Steel Corporation, Limited, in this work for four years, has been appointed Vicar of Copt Oaks, Leicestershire.

Mr. RUSSELL SMITH, chairman of Stein & Atkinson, Limited, engineers, Richmond, Surrey, for the past 10 years, has resigned and is succeeded by Mr. H. W. HOWES. Mr. Howes has been a director for 11 years.

Mr. KENNETH BRIAN SWALLOW, sub-librarian in the department of science and technology in Sheffield City Library since 1959, has been appointed librarian to the English Electric Company, Limited, at Netherton, near Liverpool.

Mr. J. A. MCINTOSH, works manager with Lane and Girvan, Limited, Bonnybridge, received book tokens and a monetary gift from the staff on leaving to be full-time instructor on foundry practice at Coatbridge Technical College, Lanarkshire.

Mr. G. H. GRANT RICHARDS has been appointed managing director of Factory Guard Systems, Limited, Birmingham. He succeeds Mr. N. G. TROILSTAD who has taken up a senior appointment with an associated company in Sweden.

For the past 11 years a lecturer in mechanical engineering at Rugby College of Technology and Art, Mr. W. R. GERMAN has been appointed head of the Engineering Department at Burnley Municipal College. He succeeds Mr. R. J. EVANS, who is taking up a post at Wolverhampton.

Mr. W. M. ROWLAND, managing director of the Universal Grinding Wheel Company, Limited, has been appointed chairman of Luke & Spencer, Limited, of Altrincham, which was taken over by Universal last September. Mr. C. W. WATERHOUSE, general manager of Luke & Spencer, and Mr. JOHN HEALEY, the assistant general manager, have also been appointed to the company's board.

Mr. J. E. RUSSELL, head of the research department of English Steel Corporation, Limited, has been installed as president of Sheffield Metallurgical Association in succession to Mr. W. C. HESELWOOD, of the United Steel Companies, Limited. Other officers elected were, vice-presidents:—Dr. A. H. SULLY, Mr. B. E. G. R. WILKINSON and Mr. H. W. KIRKBY (re-elected) and Mr. J. F. HINSLEY; secretary, Dr. D. HARDWICK, and treasurer, Mr. J. BURNETT (re-elected).

Sheffield University Senate have awarded the following Senior Research Fellowships:—Speedicut Research Fellowship in Mechanical Engineering to Dr. D. S. DUGDALE, formerly of the Illinois Institute of Technology, and a graduate of Bristol University. United Steel Companies Research Fellowship in Metallurgy to Mr. J. BEECH, a graduate of Sheffield University and a research metallurgist with the British Steel Castings Research Association. J. H. Andrew Research Fellowship in Metallurgy to Mr. D. H. WARRINGTON, a graduate of Cambridge University and at present carrying out research in the Cavendish Laboratory. C. H. Desch Research Fellowship in Metallurgy to Mr. A. MITCHELL, a graduate of Oxford University, at present doing research there.

Mr. R. P. NEWMAN, A.M.I.MECH.E., has been appointed head of the members' service department of the British Welding Research Association in succession to Mr. P. H. R. LANE, who has been appointed the first director of research of the recently formed Drop Forging Research Association. Mr. Lane took up his new appointment on March 1. Mr. T. R. GURNEY, M.A., A.M.I.C.E., succeeds Mr. Newman in charge of fatigue researches at BWRA. The offices of the Drop Forging Association are at Hoyle Street, Sheffield 3. The hon. secretary is Mr. A. L. STUART TODD, C.B.E., J.P.

Company News

FLUIDRIVE ENGINEERING COMPANY, LIMITED—Dividend for year ended September 30, 1960, is 13 (12) per cent. Group net profit increased to £114,540 (£94,897), after tax of £67,217 (£70,709), and including unrequired tax £4,363 (£1,318).

ALUMINIUM, LIMITED—Consolidated sales of aluminium in 1960 were 705,000 tons, against 643,000 tons in 1959. Preliminary net income was $39,000,000 ($24,000,000) and the earnings per share totalled $1.28, against 79 cents. per share in 1959.

AFRICAN MALLEABLE FOUNDRIES, LIMITED—Profit for 1960 is similar to that of the previous 12 months despite reduction in turnover. The foundry has a full order book; further mechanization is being adopted to compensate for increased cost of labour.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—In future an interim dividend is to be paid. It will be declared in July and paid in September. The current year's trading results are close to those expected, says the chairman, Capt. A. R. S. Nutting.

DOWTY GROUP, LIMITED, aircraft-equipment manufacturers, of Cheltenham (Glos)—An interim dividend of 4 per cent., tax free, for the year to March 31, 1961, has been declared against the equivalent of 3.6 per cent. net. The directors state that there is no reason to expect a lower rate of final dividend than last year. A final dividend of 5½ per cent., tax free, was paid for 1959-60 on the capital increased by a two-for-three scrip issue, making the equivalent of 9.1 per cent. net for that year.

Raw Material Markets

Iron and Steel

High-duty castings continue in heaviest demand, and many of the engineering and speciality foundries providing these are receiving good support. The recession in the car industry is restricting production at most of the foundries supplying the trade, although at some units increased demand has recently enabled them to revert to a five-day week. The tractor and commercial vehicle sections of the industry continue to specify freely for castings, and production of these is at appreciable levels.

The machine-tool trade, power, and electrical plant manufacturers, heavy engineering and other users are consuming large tonnages of high-quality castings, and overall the foundries supplying these are well occupied. The call for light castings shows little expansion. The building trades continue to utilize fairly good quantities, and although there has been some improvement in the requirements of the domestic utensil trade, the foundries supplying it could undertake more work.

Supplies of all grades of pig-iron are sufficient to satisfy the requirements of the foundries. Although one or two brands of hematite and low phosphorus irons are limited in production, alternative irons can be obtained as replacements. The low phosphorus irons are being taken up in substantial quantities, although total production is not fully absorbed. Hematite is also in good supply, and refined irons are obtained easily. High phosphorus pig-irons utilized by the light, jobbing, textile and some of the engineering foundries are plentiful, and producing furnaces can satisfy present demand.

Good demands for suitable cast-iron and steel scrap are being made by the foundries. In the Midlands the quantities arising fall short of requirements, particularly for the better and heavier grades of cast-iron scrap, while special qualities are scarce. Foundry coke deliveries are satisfactory, and ganister, limestone, and firebricks are readily available.

Most of the re-rollers continue well occupied, and orders on hand for small bars and light sections enable them to maintain good outputs. Present demands, however, are on a reduced scale and additional tonnages will be needed later if production is to be maintained at present levels. Some of the mills are working at reduced levels because of the lighter demand from the motor industry for hot rolled strip and bright bar. The re-rollers producing reinforcing rods and bars are very busy.

Plentiful supplies of mild-steel billets are available, and in addition to supplies from home steelworks consignments from abroad have increased stocks held by the re-rollers. Most of the home producers of billets are short of orders to cover their outputs. For carbon and alloy steel billets the supply position is not so easy. All arisings of suitable re-rolling defectives and crops are readily accepted by the re-rollers.

Non-ferrous Metals

Tin is a strong market in Singapore, steady in London, and active in New York. In the East, strong Japanese buying since the Chinese New Year has been the feature of the market and this has pushed up the Malayan price to over $M403 a picul (133⅓ lb.), the highest price since August, 1960. The London market has taken its cue from the East and both "cash" and three months metal are well clear of £800 a ton. At the same time demand for tinplate has improved markedly and this has enabled the rise in the LME quotations to be held and has hoisted the New York spot price to over $1.02 a lb. It would appear that consumption of tinplate has been much better than was thought but was masked owing to the industry drawing on its stocks.

At present, demand in the opening months of this year is running at a higher rate than the comparable months in 1960. The outlook continues bright and while the price cannot be expected to gain £10 every week, continued demand on the present level will result in the price going towards higher levels. In fact there seems little in the way of the price going up to £830 a ton, the price at which the buffer stock manager can intervene in the market to keep the price stable—while his stocks last.

Copper is still under the influence of the political situation in the Rhodesias and the Congo. Fears are that should the present difficulties get out of hand supplies from both these sources may well be cut off which would soon result in the pipelines emptying and the metal becoming scarce. Moreover, there has been a work stoppage at all the Chilean ports and this, too, is a bullish factor. On the other hand, demand in London, other than for bear covering purposes, has not picked up all that much so that the quotation is still very much the product of external influences. In the US, the market has shown some improvement and the price of 29 cents a lb. applicable to both producers and custom smelters is holding firm.

Lead in London after rising from its lowest point since 1946 as a result of steady demand has once more faltered on the arrival of foreign metal, this time from the USSR. The market has been unwilling to absorb the quantities supplied so that until this source of supply dries up the price will not move far from its present range of around £64-£65 a ton. The US position is showing steady improvement and the price is holding firm at 11 cents a lb.

Zinc in London is irregular and apt to move in sympathy with either or both copper and lead. Demand is sporadic but the outlook is better as is the undertone. In the US demand has steadied up and the quotation is unchanged at 11½ cents a lb.

Die-casting Discussion Group

In November, 1960, 12 leading British die-casting engineers and metallurgists left for a visit to the United States arranged by the Zinc Alloy Die Casters Association. They attended the First National Die Casting Exposition and Congress held in Detroit by the Society of Die Casting Engineers, as well as a "Clinic Exhibit" organized by members of the American Die Casting Institute in Hartford, Connecticut. Last month some of those who had made the trip spoke to an audience of 150 men from the staff of 23 member-firms at the third of the Association's technical discussion meetings, held in the New College of Technology, Birmingham, under the chairmanship of Mr. R. Turner (Metal Castings, Limited).

The chairman of the Association, Mr. J. A. Goddard (Fry's Die-castings, Limited), described the scope of the tour and Mr. L. A. J. Lodder (Imperial Smelting Corporation, Limited) talked about the improved types of chromium plating now being used for finishing die-cast external components of American cars. Mr. G. P. Welch (Wolverhampton Die Casting Company, Limited) described various alloying and metal melting techniques that he had seen, and Mr. R. P. Bryan (Metal Castings, Limited) gave a first-hand account of the operation of giant die-casting machines with a locking force of 2,000 tons which are casting six-cylinder engine-blocks for American Motors.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated)

March 1, 1961

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P 10-ton lots or over, £23 5s. 0d., delivered Birmingham £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-Iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £43 10s. 0d. to £46 0s. 0d., scale 15s. 0d. per unit, lumpy. 75 per cent. Si, £60 0s. 0d. to £63 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons & over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C, £40 11s. 0d.; silico-manganese, £43 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

*Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £66 7s. 0d.; nickel-chrome, £97 1s. 0d.; nickel-chrome-molybdenum, £109 14s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £226 0s. 0d. to £226 5s. 0d.; three months, £226 5s. 0d. to £226 10s. 0d.; settlement, £226 5s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb.; rods, 244s. 0d. per cwt. basis; 20 s.w.g., 270s. 0d. per cwt.

Tin.—Cash, £802 0s. 0d. to £802 10s. 0d.; three months, £803 0s. 0d. to £803 10s. 0d.; settlement, £802 10s. 0d.

Lead (Refined Pig).—First half March, £63 15s. 0d. to £63 17s. 6d.; first half June, £64 15s. 0d. to £64 17s. 6d.; settlement, £63 17s. 6d.

Zinc.—First half March, £83 15s. 0d. to £84 0s. 0d.; first half June, £82 15s. 0d. to £83 0s. 0d.; settlement £84 0s. 0d.

Zinc Sheets, etc.—Sheets, 15g., and thicker, all English destinations, £122 12s. 6d.; rolled zinc (boiler plates), all English destinations, £120 17s. 6d.; zinc oxide (Red Seal) d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10d. per lb.; sheets to 10 w.g., 200s. 3d. per cwt.; wire, 2s. 8½d.; rolled metal, 200s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £226.

Brass (High Tensile).—BS1400, HTB1, £197; HTB2 £213; HTB3, £232.

Gunmetal.—BS1400, LG2, £221; LG3, £230; G1, 1% £294; G1, 1%, £284.

Phosphor Bronze.—BS1400, PB1 (AID released), £311; BS1400, 90/10/1, £298.

Leaded Phosphor Bronze.—BS1400, LPB1, £243.

Phosphor Bronze Strip, etc.—Strip, 283s. 9d. per cwt.; wire, 4s. 1½d. per lb.; rods, 3s. 4d.; tubes, 3s. 4d.; chill cast bars, solids 3s. 3½d.; cored 3s. 4½d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ⅛ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £245; AB2, £254.

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Publications Received

Non-ferrous Metal Statistics. Prepared by the Organization for European Economic Co-operation and obtainable through H.M. Stationery Office, P.O. Box 569, London, S.E.1; price 10s.

This report is divided into three parts, the first of which covers recent developments and short-term prospects of the European non-ferrous industry. The second part makes statistical comparisons for these metals, between the years 1950 and 1959. From diagrams published, it appears that in 1954 the foundry industry took 31.3 per cent. of the total aluminium production of the area and, though about one third more was actually consumed in foundries in 1959, expressed as a percentage of the whole, in that year it represented only 30.6 per cent. The corresponding percentage figures quoted for copper consumption in foundries are 12.2 and 10.6; for zinc, 9.0 and 12.6. No such relative figure is given for tin used in cast products but the percentage used in alloys rose from 49.5 to 50.9. Far more zinc is used for castings in the UK (18 per cent. compared with 11 per cent. for Europe) than in any other country whose statistics are surveyed; Germany being next with 12 per cent.

Giesserei-Kalender 1961. Edited by Dr. P. Schneider and published by Giesserei Verlag G.m.b.H., Düsseldorf.

This is an extremely useful diary; though perhaps a little too big for slipping into a jacket pocket, it is of satisfactory size for pockets in overalls and the like. The diary opens up with a quantity of conversion tables for physical data, applicable to foundry metals and other materials. Information is then given as to crucible sizes and capacities, refractories, compositions of German pig-irons, heat and energy values in relation to various fuels, physical constants of non-ferrous metals, lists of German standards, etc. These data are followed by a few carefully selected technical articles; production statistics—including figures for the number of foundry foremen and technologists graduating each year in Germany—and notes on the organization of the foundry industry, both in Germany and throughout the world. The diary closes with a list of (German) sources of supply of foundry raw materials.

Export Guide, Vol. V, No. 1. Published by the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2.

This issue, as is usual, points out the opportunities for British exports in 34 major markets for 36 product-groups. According to the *Guide*, prospects for the first quarter of 1961 are "good" in 19 countries, improving in three, deteriorating in 10, and unchanged in two. In the latter category, in one country (France) prospects are improving and in the other (Belgium) they are deteriorating. There are no "bad" markets reported. Since October 1960, the market has improved in Malaya and Singapore, and has deteriorated in Australia, Canada, India, Iran, Kenya, Spain and South Africa.

BSFA Bulletin, Vol. 2, No. 11. Published by the British Steel Founders' Association, 13, Broomgrove Road, Sheffield, 10.

The objective of this *Bulletin* is to inform users of castings as to the nature, variety and applications of sand used in the manufacture of steel castings, and this is done well. (In this context the word sand also includes "compo"). The book in addition briefly describes the numerous bonds used in the steel foundry and some notes are given on the mechanization of steel foundries.

Employer's Guide to Graduated National Insurance Contributions. Issued by the Ministry of Pensions and National Insurance, 10, John Adam Street, London, W.C.2.

This pamphlet (N.I. 116) is being distributed to all employers throughout the country with the objective of familiarizing them with the requirements imposed upon them by the National Insurance Act, 1959.

House Organs

The Iron Worker, Vol. 25, No. 1. Published by the Lynchburg Foundry Company, Lynchburg, Va., USA.

This issue carries an interesting story about Henry Foxall (1758-1823) who was a founder renowned for the excellence of the cannon he produced. The son of a Monmouthshire blacksmith who emigrated to America in 1797, he became an ordnance maker of real importance. He was a devout methodist, and built a chapel as a thank offering that his foundry had been spared the fate of the "White House," which the British army destroyed by fire in 1814. On the suggestion of a methodist minister the building was called the Foundry Chapel and Foxall in agreeing to this said "I accept the name, but not in compliment to myself. It shall be called so in honour of the Foundry in London, Wesley's first church." The Foundry Chapel has been rebuilt several times and is now an imposing church on sixteenth street in Washington.

Wiggin Nickel Alloys, No. 59. Issued by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

Featured in this issue is a description of a four-foot wind-tunnel recently opened at the Wharton works of English Electric Aviation, Limited. Other articles deal with precision-cast hot-plugs of Nimocast 80 heat-resisting alloy in the Land Rover diesel-engine; properties of a new casting alloy, Nimocast EPE 10, developed for very exacting high-temperature service, and the use of Incoloy DS heat-resisting alloy for oil-burner parts of a domestic central-heating boiler.

Issue No. 60 of the magazine covers the use of the company's heat-resisting alloys in furnace equipment; manufacture of Integron finned tubing; methods of measuring the thickness of electro-deposited coatings and the use of Nimonic 80a alloy for parts of racing-type motor and motor-cycle engines.

Sif-Tips, Vol. 26, No. 110. Issued by Suffolk Iron Foundry (1920), Limited, Stowmarket, Suffolk.

The repair of a flange on a magnesium gearbox casting, a process not very commonly undertaken, is described in meticulous detail in this issue by "Will the Welder." Good illustrations are used to clarify the text. Other articles cover the welding of a series of cracks in a 200-ton power cropper (to keep the machine in operation until a spare part could be obtained); high-speed brazing of furniture components, and motor-cycle production.

JOHN FOWLER & COMPANY (LEEDS), LIMITED, have negotiated a contract for the manufacture of certain components for J. I. Case Company, Limited, of America, who are now established in Great Britain. It is expected to provide greater utilization of the existing specialized plant for certain tractor components which are characteristically similar to Fowler's.

Translation Service

The availability of the following translations is announced by the Iron and Steel Institute but enquiries should be addressed to the respective organizations denoted by the initial letters BCIRA, etc. Addresses are given at the end of the list.

BCIRA 980 CAST-IRON AND FUMING SULPHURIC ACID. Beran, J. *Werkstoffe und Korrosion*, 1959, vol. 10, Nov., pp. 665-66.

MT 128 STUDY OF THE ORIGIN OF NON-METALLIC INCLUSIONS IN STEEL BY MEANS OF THE RADIOACTIVE ISOTOPE Ca^{45}. Cadek, J. *Hutnické Listy*, 1959, *vol.* 14, No. 6, pp. 478-84.

VDEh B 26.21 BETRACHTUNGEN UBER DEN EINFLUSS VON ZUBATZEN AUF DIE GRAPHITBILDUNG IN GUSSEISEN. Drapal, S. *Hutn. Listy*, 1957, *12*, pp. 683-87.

MT 167 STRUCTURAL CHANGES DURING THE HEAT-TREATMENT OF CAST 13 PER CENT. CR STEELS. Drapal, S. *Hutnické Listy*, 1960, vol. 15, No. 12, pp. 961-71.

BCIRA 974 APPARATUS FOR OPENING AND CLOSING TAPHOLES OF A CUPOLA. Fichtner, R. *Stahl u. Eisen*, 1914, vol. 34, May 28, pp. 903-8.

BCIRA 979 CAST IRON IN EQUIPMENT FOR THE CHEMICAL INDUSTRY. Forst, P. von der. *Werkstoffe und Korrosion*, 1959, vol. 10, April, pp. 213-18.

BCIRA 978 DUST REMOVAL FROM CUPOLAS. Goenaga, R. *Proceedings* of the International Foundry Congress, Brussels, 1958, pp. 694-706.

MT 154 DETERMINATION OF CALCIUM IN ALUMINIUM AND ALUMINIUM-ALLOYS (SILUMINS) BY MEANS OF A FLAME PHOTOMETER. Kubista, Z., V. Kabicky, & N. Tietz. *Hutn. Listy*, 1960, vol. 15, No. 6, pp. 479-80.

BCIRA 975 REVIEW AND DEVELOPMENT OF WATER-COOLED CUPOLAS. Longaretti, C., & C. Pensotti. *Proceedings* of the International Foundry Congress, Brussels, 1958, pp. 707-39.

BCIRA 973 PLASTIC PATTERNPLATES. Maul, H., & Mr. Schorn. *Giesserei-Praxis*, 1959, No. 12, June 25, pp. 217-20.

BCIRA 976 RESULTS OF INOCULATION EXPERIMENTS ON CAST IRON WITH ALLOYS CONTAINING COPPER AS "CARRIER". Meerssemman, J., and W. Simoens. *Fonderie Belge*, 1959, vol. 29, Oct., pp. 244-48.

BCIRA 977 COMPARATVE TESTS ON CYCLONE DUST REMOVAL. Miczek, G. *Staub*, 1960, vol. 20, Jan. 1, pp. 9-13.

BCIRA SOLIDIFICATION OF CENTRIFUGALLY-CAST PIPE IN FLAKE- AND NODULAR-GRAPHITE IRONS. Nipper, H. International Foundry Congress Paper No. C.26, Madrid, 1959.

MT 129 OCCURRENCE OF BLOWHOLES IN CASTINGS AND MEASURES FOR THEIR ELIMINATION. Ornst. J. *Slévárenství*, 1959, vol. 7, No. 11, pp. 433-38. (£6 10s.)

VDEh B. 25.6 TECHNOLOGISCHE EINFLUSSGROSSEN AUF DIE LEBENSDAUER VON KOKILLEN. Pishchev, V. M. *Lit. Proizv.*, 1958, No. 3, p. 7.

MT 165 STEELS AND CAST IRONS WITH HIGH BORON CONTENT. Vrtel, J. *Hutn. Listy*, 1960, vol. 15, No. 12, pp. 945-50.

OTS JPRS-3512 BOILING HEAT-TRANSFER OF LIQUID METALS. Chi-Fang Lin, Yu-Chi'I Yang, Fan-Kuo K'Ung, Kuei-Ch'En Hseing, and Chia-Hsiang Wang. *K'o Hsueh T'ung Pao*, 1959, pp. 832-3. ($0.50.)

MT 114A—COMMENT ON THE ARTICLE OF SMRHA AND BRODSKY: INFLUENCING THE SOLIDIFICATION OF INGOT HOT-TOPS BY MEANS OF EXOTHERMIC POWDERS AND LININGS. Chvorinov, N. *Hutnické Listy*, 1960, *15*, No. 9, pp. 720-723.

PERGAMON, R. 49 AUTOMATION OF TECHNOLOGICAL PROCESSES IN FERROUS METALLURGY. Dizhur, M. M. (Book) 1959 pp. 213. £2 17s., $8.50.)

NEW DEVELOPMENTS IN NI/NI-CR THERMOCOUPLES. Edwin, B. E. *Elektrowärme*, 1960, vol. 18 (7), July, pp. 222-25. Abridged translation, *Engineer's Digest*, 1960, vol. 21, (11), Nov., pp. 88-89.

MT 136 THE INFLUENCE OF METALLURGICAL FACTORS ON THE MECHANICAL PROPERTIES OF CASTINGS IN 13 PER CENT. CHROMIUM STEEL MELTED IN INDUCTION FURNACES. Koutsky, J. *Hutnické Listy*, 1960, *15*, No. 3, pp. 179-188.

MT 138 EFFECT OF METALLURGICAL FACTORS ON THE BRITTLENESS OF CASTINGS IN 13 PER CENT. CR STEEL MELTED IN ARC FURNACES. Koutsky, J., and F. Kinsky. *Hutnické Listy*, 1960, *15*, No. 7, pp. 524-28

PERGAMON R. 114 METALLURGY OF CAST IRON. AN EDUCATIONAL HANDBOOK FOR METALLURGICAL HIGHER-TECHNICAL COLLEGES. Krasavtsev, N. I. (Book) 1952 (£3, $10.00.)

Symbols for sources of translations:—

BCIRA: British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham. MT: Mr. de O. Tollemache, The Old Rectory, Lewknor, Oxon. VDeh: *Verein Deutscher Eisenhüttenleute*, Breit Strasse 27, Düsseldorf, Germany. OTS: Office of Technical Services, Department of Commerce, Washington 25, D.C., USA: Pergamon: Pergamon Institute, Headington Hill Hall, Oxford.

FACTS AND FRICTION

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Pig-iron and Steel Production

Statistical Summary of November, 1960 Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in November. Table 3, weekly average production of finished steel in October. Table 4 gives the production of pig-iron and ferro-alloys in November, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100			Iron-ore output.	Imported ore used.	Coke sent to blast furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			Stocks.[3]
	Iron and steel.	Coal.	Basic materials[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	
1958	343	503	478	276	202	227	245	196	9	369	284	2,242
1959	340	497	477	286	244	210	242	208	7	388	291	2,244
1960—Aug.[4]	339	483	476	321	296	255	291	214	32	423	310	2,619
Sept. ..	339	520	473	336	317	265	306	252	25	481	391	2,644
Oct. ..	339	520	472	344	332	273	314	256	17	497	387	2,625
Nov. ..	339	539	473	344	337	279	315	266	20	505	371	2,677

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in November.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics, Notts, Northants, and Essex ..	—	4.9	16.0 (basic)	2.6	0.1	22.2	1.4	23.6
Lancs (excl. N.-W. Coast), Denbighs, Flints, and Ches	1.4	41.7	—	5.7	0.3	47.7	1.4	47.6
Yorkshire (excl. N.-E. Coast and Sheffield) ..								1.5
Lincolnshire	—	50.3	—	—	0.1	50.3	0.1	50.4
North-East Coast	0.6	97.8	—	1.8	0.4	98.5	2.1	100.6
Scotland	1.3	54.2	—	4.1	—	57.2	2.4	59.6
Staffs, Shrops, Worcs, and Warwicks	—	28.9	—	4.6	0.8	32.3	2.0	34.3
S. Wales and Monmouthshire	2.1	94.7	17.7 (basic)	0.8	0.2	115.0	0.5	115.5
Sheffield (incl. small tonnage in Manchester) ..	8.8	39.8	—	15.2	0.4	62.0	2.2	64.2
North-West Coast	0.1	—	6.2 (acid)	0.9	—	7.0	0.2	7.2
Total	14.3	412.3	39.9	35.7	2.3	492.2	12.3	504.5
October, 1960	13.7	407.2	39.1	34.7	2.3	484.7	12.3	497.0
November, 1959	14.1	377.1	33.3	32.0	2.1	447.6	11.0	458.6

TABLE 3.—*Deliveries of New Non-alloy and Alloy Finished Steel.*

Product.	1958.	1959.	1959.	1960.	
			Oct.	Sept.	Oct.
Non-alloy steel:					
Ingots, blooms, billets, and slabs[5]	4.6	5.1	4.9	6.6	5.4
Heavy rails ..	10.2	6.8	6.4	8.6	9.2
Sleepers	1.2	0.6	0.3	2.0	0.9
Fishplates and soleplates	0.7	0.4	0.5	0.7	0.6
Plates, 3 mm. thick and over:	47.3	43.1	49.6	56.9	59.2
Other heavy prods.	41.8	41.2	51.5	56.1	60.2
Ferro-concrete bars	7.6	9.6	11.7	14.3	13.5
Wire rods	21.5	23.5	27.9	29.8	32.2
Arches, etc. ..	8.6	7.8	7.6	8.3	8.2
Other light sections	29.1	33.0	39.5	43.7	44.6
Bright steel bars ..	6.2	7.6	9.1	10.6	10.6
Hot-rolled strip ..	22.6	27.4	31.3	36.3	36.2
Cold-rolled strip ..	7.0	8.0	9.7	11.6	11.0
Sheets, incl. coated:	41.7	47.0	53.2	54.5	56.8
Tinplate:	18.7	20.9	21.3	23.8	23.2
Blackplate	0.8	0.7	0.8	1.1	1.1
Tubes up to 16 in.	19.0	20.6	25.4	27.7	21.4
Tube fittings, etc.	0.4	0.4	0.5	0.5	0.4
Tyres, wheels, and axles	4.5	2.4	2.0	2.2	2.5
Forgings (excl. drop)	2.6	2.1	2.2	2.5	2.5
Steel castings ..	4.2	3.6	3.8	4.6	4.6
Tool steel	0.2	0.2	0.5	0.3	0.3
Total	300.5	312.0	359.7	402.7	404.6
Alloy steel	16.1	18.2	21.7	25.0	25.5
Total deliveries from UK prod.[6]	316.6	330.2	381.4	427.7	430.1
Add: Imported finished steel ..	7.0	7.1	7.8	21.6	16.1
	323.6	337.3	389.2	449.3	446.2
Deduct: Intra-industry conversion[7] ..	41.2	47.6	54 4	59.6	60.3
Total new material ..	282.4	289.7	334.8	389.7	385.9

TABLE 4.—*Production of Pig-iron and Ferro-alloys.*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants, and Essex	21	—	30.4	20.9	0.1	—	51.4
Lancs (excl. N.-W. Coast), Denbighs, Flints and Ches ..	7	—	25.5	—	—	1.6	27.1
Yorks (excl. N.-E. Coast and Sheffield)	—	—	—	—	—	—	—
Lincolnshire ..	10	—	45.8	—	—	—	45.8
North-East Coast	18	2.5	66.4	—	—	1.7	70.6
Scotland	7	0.2	25.8	1.6	—	—	27.6
Staffs, Shrops, Worcs, and Warwicks ..	5	—	11.2	0.9	—	—	12.1
S. Wales and Monmouthshire	11	2.9	53.4	0.7	—	—	57.0
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	8	17.7	—	1.0	—	1.2	19.9
Total ..	89	23.3	262.0	25.1	0.1	4.5	315.0
October, 1960 ..	87	25.3	259.0	25.2	0.1	4.3	313.9
November, 1959	78	22.9	228.3	23.3	0.7	2.1	277.3

[1] Used in non-food manufacturing industries.
[2] Weekly average of calendar month.
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.

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Imports and Exports of Iron and Steel in December

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in December last year. Totals for 1959 and 1960 are also included.

Total Exports of Iron and Steel

Destination.	Month ended Dec. 31.	Twelve months ended December 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Cyprus	291	1,684	2,145
Sierra Leone	628	9,132	7,928
Ghana	629	26,039	20,846
Nigeria	5,509	74,608	59,538
Union of South Africa	7,360	43,966	70,056
Rhodesia and Nyasaland	2,369	21,301	27,809
Tanganyika	580	19,227	15,006
Uenya	899	26,168	28,195
Kganda	189	4,050	1,599
Mauritius	252	1,792	4,435
Aden	184	3,063	2,693
Bahrein, Qatar, and Trucial States	755	9,291	14,270
Kuwait	971	9,730	6,572
India	21,561	211,143	254,147
Pakistan	2,588	48,528	60,080
Singapore	2,031	21,663	23,361
Malaya	1,412	10,922	18,284
Ceylon	2,352	36,185	48,423
British North Borneo	122	2,931	4,189
Hongkong	7,015	68,515	82,807
Australia	18,717	87,227	198,070
New Zealand	17,616	103,551	144,180
Canada	5,519	233,071	194,185
Jamaica	1,258	22,208	24,033
Trinidad	3,865	39,561	39,254
British Guiana	647	6,659	8,774
Other Commonwealth countries	4,549	36,623	34,657
Eire	4,271	51,229	61,929
Soviet Union	—	33,302	27,122
Finland	4,285	38,551	50,528
Sweden	15,714	134,560	173,419
Norway	9,128	100,199	120,213
Denmark	5,796	96,451	96,022
Western Germany	9,893	133,780	133,175
Netherlands	7,697	106,334	117,720
Belgium	1,074	39,844	30,586
France	662	6,065	9,803
Switzerland	1,588	8,863	14,676
Portugal	1,352	14,816	16,126
Spain	1,266	26,446	43,082
Italy	2,471	46,328	43,612
Austria	831	4,505	5,539
Yugoslavia	3,962	5,715	38,644
Greece	2,134	11,131	20,494
Turkey	1,316	5,460	20,769
Netherlands Antilles	188	3,292	3,307
Portuguese East Africa	428	1,684	4,479
Egypt	678	7,170	13,836
Sudan	876	7,694	9,667
Lebanon	46	4,069	1,958
Israel	984	14,358	18,547
Saudi Arabia	43	3,218	559
Iraq	6,242	74,302	58,004
Iran	7,281	38,591	77,480
Burma	617	8,790	5,840
Thailand	347	7,920	6,252
Indonesia	1,426	10,017	23,436
China	1,214	61,595	51,026
Japan	6,400	193,002	78,364
Philippine Republic	737	8,390	7,283
USA	7,729	208,620	189,706
Cuba	59	8,836	6,718
Colombia	454	5,918	9,231
Venezuela	2,420	64,316	40,294
Ecuador	272	1,025	3,041
Peru	955	5,035	5,725
Chile	61	1,540	3,871
Brazil	1,107	25,040	25,837
Uruguay	482	3,444	8,957
Argentina	7,742	194,683	86,811
Other foreign countries	9,631	101,783	133,238
TOTAL	241,377	3,104,749	3,293,462

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Total Imports of Iron and Steel

From	Month ended Dec. 31.	Twelve months ended December 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Union of South Africa	1,612	28,103	29,615
Rhodesia and Nyasaland	3,151	5,383	14,447
Canada	38,225	22,997	286,126
Other Commonwealth countries and Eire	1,531	14,758	50,449
Soviet Union	469	67,251	28,545
Sweden	5,992	30,873	52,909
Norway	15,136	91,202	160,993
Poland	26	5,562	8,886
Western Germany	7,543	78,615	126,873
Netherlands	9,062	164,610	190,978
Belgium	5,881	23,335	114,857
Luxembourg	2,440	7,484	16,870
France	4,025	25,991	65,167
Italy	106	13,510	21,707
Austria	18	4,537	10,397
Japan	353	2,750	6,986
USA	3,657	26,297	334,586
Other foreign countries	16,511	13,153	166,700
TOTAL	115,738	626,411	1,687,091
Iron and steel scrap and waste fit only for the recovery of metal	54,817	2,873	278,603

Exports of Iron and Steel, by Product

Product.	Month ended Dec. 31.	Twelve months ended December 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Pig-iron	9,628	157,959	145,749
Ferro-columbium (niobium)	1	71	97
Ferro-tungsten	64	1,282	1,048
Other ferro-alloys	456	9,408	11,569
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	3,407	82,660	25,611
Pieces roughly shaped by forging	131	1,267	954
Iron bars, rods, angles, shapes, and sections	130	2,116	1,804
Steel bars, rods, angles, sections, and shapes	48,372	543,914	620,833
Iron plates and sheets	14	390	580
Universal plates	1,508	8,762	21,665
Steel plate, 3 mm. and under 4·5 mm. thickness	3,613	40,240	38,728
Ditto, 4·5 mm. or more in thickness	20,542	231,231	336,104
Blacksheets and blackplate	22,020	287,205	292,247
Hoop and strip	8,816	83,905	104,169
Tinplate	31,295	468,257	488,489
Decorated tinplate	579	8,217	6,368
Galvanized sheets	5,992	85,689	82,221
Other (incl. tinned sheets, terneplate, and ternesheets)	2,688	22,048	29,171
Railway and tramway construction material	11,346	164,664	172,879
Wire rods of steel (incl. alloy steel)	5,487	49,429	56,485
Wire	10,543	109,852	121,575
Tubes, pipes, and fittings	54,745	746,193	735,116
TOTAL	241,377	3,104,749	3,293,462

Sir STUART GOODWIN, the Sheffield industrialist, has offered to provide a goodwill distribution of money to deserving people in the borough and rural district of Retford, Nottinghamshire, at Easter. Sir Stuart, is Lord High Steward for the Borough of Retford.

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NATURALLY

High above the gaping crowd he walks, the very epitome of natural skill developed by years of unrelenting application and practice.
High indeed in the field of non-ferrous metals stands Platt. A natural flair for manufacturing brass, bronze, gunmetal, zinc and lead alloys is accented by modern plant and laboratory equipment.
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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Twenty words for 10/- (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

METALLURGIST (L.I.M.), aged 26, desires position with a progressive company. Experience of the cupola melting of grey irons and whiteheart malleable. Some experience of S.G. iron. Metallurgical analysis, metallography and mechanical testing. Accustomed to control of laboratory. Anything considered. North of England preferred. Box ML628, FOUNDRY TRADE JOURNAL.

AM 42, married, have A.I.M., Management Diploma. Executive U.S. machine tool and British light castings foundries. Have foundry design and layout, research and development experience. Seek permanent position in modern foundry or with foundry management consultants. Will travel. Box AM629, FOUNDRY TRADE JOURNAL.

INDIAN FOUNDRYMAN, 36, M.I.B.F., returning India, seeks position with British concern, ferrous, non-ferrous, 15 years' experience. Box IF612, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER, 44, with life-time experience in foundry trade, desires change. First-class knowledge of all modern production methods for C.I. including mechanised production of moulds and cores. Has ability to organise administration and technical staff and has an excellent customer relationship. Box GM582, FOUNDRY TRADE JOURNAL.

FOUNDRY EXECUTIVE, 35, B.Sc., experience of ferrous and non-ferrous trade, desires post with prospects. Production or representation considered. Foundry equipment, foundry suppliers, consultancy, etc. All enquiries answered. Box FE616, FOUNDRY TRADE JOURNAL.

TECHNICAL ENGINEER wishes to represent a Foundry for Grey Iron, Aluminium and Non-ferrous Metals Die-castings in Aluminium, Mazak Lead, and Tin Alloys, etc. First class connection with works in London and Home Counties. Part expenses and commission. Box TE613, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE with live Midlands and Eastern Counties connections in Builders, Plumbers and Engineering Castings prepared to consider Agencies in similar lines, or would consider any proposal from small Foundry where selling difficulties of output are experienced. Box RW622, FOUNDRY TRADE JOURNAL.

TECHNICALLY trained FOUNDRYMAN, aged 50, well known at Directors' level, seeks post as Technical Liaison, Service Engineer, Representative. Box TT609, FOUNDRY TRADE JOURNAL.

MELTING SHOP FOREMAN (30), wide experience acid/basic E/A furnaces, all types high and low alloy steels, seeks similar position overseas, preferably India. Box MS615, FOUNDRY TRADE JOURNAL.

SITUATIONS WANTED—*contd.*

WORKS FOUNDRY MANAGER, 41, desires change. Patternmaking/foundry apprenticeship, wide experience practical, technical, commercial, non-ferrous, grey iron. Jobbing, repetition. Three years outside technical sales, well known, good connections, able introduce new business. Midlands preferred. Box WF611, FOUNDRY TRADE JOURNAL.

Advertisers whose announcements appear under a box number are urged to acknowledge, however briefly and informally, all replies received. This particularly applies to advertisements under "Situations Vacant"; serious inconvenience and, sometimes, real hardship can be caused to applicants who receive no indication even of the safe receipt of their communication. Failure to acknowledge replies can also reflect on the good faith of this journal, which is responsible for their onward transmission. If it is desired to maintain anonymity, an acknowledgement on plain paper, quoting the relevant box number, is all that is necessary.

SITUATIONS VACANT

PATTERNMAKERS (wood or metal) required. Rate 7s. 8d. per hour, plus quarterly output bonus for right men. STANDARD PATTERN CO., LTD., 25a, Broadwall, Stamford Street, S.E.1. WAT. 6875.

SITUATIONS VACANT—*contd.*

CAST IRON PIPES AND CONNECTIONS

FOUNDRY SUPERINTENDENT wanted for FOUNDRY in the Glasgow area. Applicants should have good knowledge of work in Greensand and CO_2 and be able to control labour. Salary in accordance to experience and qualifications, but will be a first class position to the successful candidate. Write in first place to Box No. 2320, WM. PORTEOUS & CO., Glasgow.

MORGAN CRUCIBLE

have a vacancy in the Crucible Technical Application Department at Norton, Near Worcester, for a

CRUCIBLE TECHNOLOGIST

AGE 28-35, with a degree or equivalent in Metallurgy or Ceramic Technology. Experience in the Steel Industry essential. Some knowledge of the Non-ferrous Foundry Industry an advantage.

The responsibilities are varied and interesting: To provide technical liaison between customers, Sales Departments and Factory; to extend the use of existing products by investigating new applications; to co-operate with Research and Development Departments in producing and field-testing new products.

The successful candidate will, after short training at Battersea, be based on Norton and will be required occasionally to visit customers in this country or abroad.

Apply, giving full details, and quoting Ref. AM/26 to:

The Staff Manager
THE MORGAN CRUCIBLE CO., LTD.,
Norton, Worcester

MSL *have been retained to advise on the appointment of*

TECHNICAL SALES ENGINEERS

for a company specialising in the design and construction of industrial furnaces and associated equipment. The company has recently embarked on a policy of expansion with a view to increasing its range of products and requires Technical Sales Engineers to assist in this development.

Candidates should have had technical sales experience, preferably in combustion equipment as applied to the steel or light engineering industries. Consideration will also be given to those who have been engaged in development work in these fields. A degree or other qualification in mechanical engineering or fuel technology would be an advantage, but this is not essential as general experience is most important.

Preferred age 35 to 45. The starting salary will be by negotiation and will depend on experience and ability, but would be in the region of £1,700 plus a non-contributory pension scheme. A car will be provided. Please send brief details in confidence quoting reference GT.3110 to M. B. Berks.

MANAGEMENT SELECTION LIMITED
17 Stratton Street, London, W.1

In no circumstances will a candidate's identity be disclosed to our client unless he gives permission after a confidential interview at which he will be given full details of the appointment.

SITUATIONS VACANT—contd.

FOUNDRY PRODUCTION MANAGER required by expanding Ferrous and Non-ferrous Foundry on the South Coast, to act as intermediary between Works Manager and Foundry Foreman. Duties will include Production Planning and metallurgical control. Must have practical and technical experience. Permanent, pensionable post with good prospects for advancement. Box FP625, FOUNDRY TRADE JOURNAL.

METALLURGIST — ASSISTANT required by Company operating modern mechanised Foundries producing Grey, High Duty and Malleable iron castings. Experience in Cupola operation in one of these fields is desirable since successful applicant will be required to take control of a melting unit. Excellent opportunity for Metallurgist in the age range 23-30 to join expanding organisation. Modern housing accommodation can be arranged if required. Please apply, giving age, details of experience and salary required to PERSONNEL OFFICER, Guest, Keen & Nettlefolds (Cwmbran), Ltd., Clomendy Road, Cwmbran, Mon.

FOUNDRY FOREMAN required. Must be experienced in batch production of small castings by mechanised moulding and coremaking methods, and accustomed to handling labour. Location, Hertfordshire. Write stating age and salary requirements. Box FF626, FOUNDRY TRADE JOURNAL.

NATIONAL FOUNDRY COLLEGE
Stafford Street, Wolverhampton

THE Governors of the College invite applications for the post of

SENIOR LECTURER

A University Degree (preferably in Engineering) or its equivalent, together with qualifications in Management are essential. Candidates should have had a sound training in the Foundry Industry, and experience in Foundry Management would be a distinct advantage.

The salary will be in accordance with the Burnham Scale (£1,550—£1,750).

Full particulars may be obtained from:

The Clerk to the Governors, National Foundry College, Education Offices, North Street, Wolverhampton.

FOUNDRY METALLURGIST required for an Iron Foundry in the West of Scotland, specialising in ingot moulds and alloy castings, including S.G. The candidate must be capable of taking full responsibility for technical control of founding, testing, etc. Salary in accordance with qualifications and experience, but not less than £1,250 per annum. Assistance with housing will be considered. Reply to THE SECRETARY, Fullwood Foundry Company, Limited, Mossend, Bellshill, Lanarkshire.

Patternmakers, Machine and Floor Moulders, Coremakers

required for expanding Foundry of

Andersons Ltd., Engineering Works in Christchurch, New Zealand

THESE will be permanent positions, providing excellent salaries and conditions in an old well established Foundry producing Spheroidal Graphite and Alloyed Irons.

Reply in first instance to:

Foundry Manager,
ANDERSONS LTD.,
P.O. Woolston,
Christchurch, New Zealand.

SITUATIONS VACANT—contd.

CORE DEPT. SUPERINTENDENT required to take full charge of a Core Shop making Machine Blown, Bench and Shell Cores for a foundry producing 500 tons of Automobile and similar Grey Iron Castings per week. Applicants must have of necessity, drive and ability and be capable of controlling a department employing 200 people, both male and female. Basic salary in the region of £1,150 per annum and bonus based on results. Box CD623, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for small grey iron Foundry producing castings up to 10 tons, also non-ferrous castings. Write, stating age, experience, salary, references, to: THE SECRETARY, W. H. Baxter, Ltd., 71, Gelderd Road, Leeds, 12. Please mark your envelope "Private."

OPPORTUNITY for keen ENGINEER to assist in the planning and installation of a new mechanised Foundry. Excellent prospects. Apply giving details of age, experience, qualifications and salary required to Box OF619, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN. — Applications are invited from men between the ages of 30 and 45 for the position of Section Foreman to take charge of the sand slinger, bench moulding and shell moulding sections of a large modern mechanised grey iron foundry in the West Riding.

The foundry produces up to 120 tons of machinery castings per week ranging in weight from a few ounces up to 4 cwt.

Candidates must possess a thorough practical knowledge and have experience in all phases of modern grey iron practice, particularly in the above sections. He must have drive, initiative and organising ability and be able to control labour.

Reply in confidence, giving details in chronological order of experience and positions held and indication of salary to Box MF610, FOUNDRY TRADE JOURNAL.

ASSISTANT TO FOUNDRY MANAGER REQUIRED

Applications are invited from men between the ages of 30 and 45 for the position of Assistant to the Foundry Manager in a modern mechanised grey iron foundry in the West Riding. The foundry produces up to 120 tons of machinery castings per week, ranging in weight from a few ounces to 4 cwt. These are produced on a fully mechanized plant with ancillary floor and bench moulding sections.

Candidates must possess a thorough practical and technical knowledge and have experience in all phases of modern grey iron foundry practice. He must have drive, initiative, organizing and executive ability and be able to control labour.

The post, which carries full staff status with contributory pension scheme, is progressive and offers scope for promotion. Assistance with housing is possible for the successful candidate.

Applicants should state age and give in chronological order full details of training, experience and positions held, with an indication of salary level.

All applicants will be treated in strict confidence and acknowledged.

Write:

BOX AA624
Foundry Trade Journal

SITUATIONS VACANT—contd.

METALLURGIST

WITH at least five years' experience of foundry practice and heat treatment required at the Watson House Research Laboratories of the GAS COUNCIL at FULHAM, S.W.6. The successful candidate will be engaged in an extended development programme on the industrial utilisation of gas. Starting salary will be in the region of £1,200 per annum. Contributory Staff Pension Scheme. Applications should be sent to the STAFF CONTROLLER, North Thames Gas Board, 30, Kensington Church Street, W.8, within 10 days of the appearance of this advertisement, quoting reference FJ/26.

TECHNICAL SALES REPRESENTATIVE required for London and S.E. Counties by Foundry and General Engineering Company. Established connections and ability to promote new contacts necessary. Write in confidence giving fullest details of experience, age and salary required, to SALES MANAGER, East Sussex Engineering Co., Ltd., Phoenix Iron Works, Lewes, Sussex.

MACHINERY WANTED

WANTED—Electric Stoving Oven, 400 volts standard A.C. supply, 20-40 kW, with forced air circulation. Maximum operating temperature 400 deg. C. WHITEFIELD MACHINERY & PLANT LIMITED, 48, Chatham Street, Stockport, Cheshire.

WANTED.—One R.2. and One R.4. Core Blower. One W.T.B.1A Wheelabrator. Box WO618, FOUNDRY TRADE JOURNAL.

AIR COMPRESSOR required. Alley and McLellan. Two-stage approximately 300 F.A.D. 100 lb. per sq. inch delivery pressure. DUDLEY FOUNDRY CO., LTD., Moor Lane, Brierley Hill, Staffs.

MORGAN Oil Fired Furnace wanted. 120 lb. capacity, or Oil Burner and Fan for conversion. BINNS, Lune Street Foundry, Blackburn.

WANTED.—One HPL 1. B.M.M. Moulding Machine in good condition. W. H. ROWE & SON, LTD., Quayside Road, Bitterne Manor, Southampton.

WANTED.—Tilghman Belt Conveyor Wheelabrator, preferably B.C.40. Box WT620, FOUNDRY TRADE JOURNAL.

WANTED.—Small size Wheelabrator required, also quantity of Moulding Boxes, 14 in. × 8 in., 12 in., 14 in. and 16 in. square, 16 in. round. Box SS617, FOUNDRY TRADE JOURNAL.

REQUIRED

TWO FURNACE SHELLS for BIRLEC DETROIT L.F.Y. ROCKING ARC

Particulars to:

MESSRS.
PETER BILLSON & CO. LIMITED
TRIPLET WORKS, PIKEHELVE STREET, WEST BROMWICH, STAFFS.
Telephone: TIP 2453/4

MACHINERY FOR SALE

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BREALEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel.: Misterton 202.

TWO good Morgan 250-lb. Type "8" Coke Fired Tilting Furnaces complete with fans and motors, in use until recently in brass foundry. Apply: WAGON REPAIRS, LTD., Imperial House, Bournville Lane, Birmingham, 30.

ONE Shot Blast Cabinet by Spencer & Halstead. Cabinet size 30 in. × 30 in. × 30 in. approx.
One Browett & Lindley Compressor, 600 C.F.M., complete with electric motor, starter, after cooler, air receiver, etc., in full working order.
For further details please write Box OS627, FOUNDRY TRADE JOURNAL.

FOR SALE.—6 ft. Rotary Table Shotblast Plant, by St. George's Engineering.

S. C. BILSBY & CO.,
Hainge Road, Tividale, Staffs
Tipton 2448

FOR SALE.—One Gutman Rotary Shotblast. Apply: JOHN HARPER & CO., LTD., Albion Works, Willenhall, Staffordshire.

FOR SALE

TWO Rotary Feed Tables, 6 ft. 6 in. diameter, driven through David Brown gearbox by 3 h.p. motor, 400/3/50, complete with feed bunkers. £50 each.
Three Gear type Furnace Ladles by Riley, 10 cwt., 1 ton and 30 cwt.; all excellent condition. £35 each.
Oil Heater, Fan and Burner Unit, used for drying furnace ladles. £30.
Cupola Blowing Fan, totally enclosed motor direct mounted to fan case. £20
Steel Slat type Conveyor, 20 ft. centres bench height, 10 in. wide. £40.

WALKER & PARTNERS LTD.,
23, Claremont Crescent,
Sheffield 10.
'Phone 62428-9.

Large stock of Geared Ladles up to 8 tons capacity. List on request.
Few Roper Ladles and Roper Ladle hoists, 3 and 5 cwts. capacity.
British Moulding Machine size A.T.O.S.
Morris Screenerator, almost new.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflets.
Adaptable Moulding Machines. Large and small size.
Jackman Sand Mill, 5 ft. diameter. Motorised a.c. 3-phase.
Several Pneulec Royer Sand Mixers.
Large stock of small Moulding Boxes at low prices to clear. List on request.
Several Cummings coke fired furnaces.
Cummings oil Sand Mixer.
Two Pneulec jolt squeeze Moulding Machines.
Large stock of Morgan Tilting Furnaces.
200 assorted Keith Blackman Fans.
Salter 2-ton Dial crane Weighing Machine. Just received from the makers.
Suspended electric sieve.
Luke & Spencer double ended 24 in. high speed Fettling Grinder, with 3-speed independent drive, standard a.c. 3-phase.
Please write for out new stock list.

ELECTROGENERATORS LTD.
Australia Road, Slough, Bucks.
Tel.: Slough 22877 & 22094

MACHINERY FOR SALE—*contd.*

TWO MORRIS MULBARO UNITS, five and eight years old respectively. Both in sound condition. Best offer accepted. JOHNSON, RADLEY & SONS, LTD., Hillidge Road, Leeds, 10.

ONE TYPE B.S.3., 400 lb. capacity Black Seam Crucible Tilting Furnace complete. One Type B.S.4., 600 lb. capacity Black Seam Crucible Tilting Furnace complete.—JOHN PRITCHARD & SONS, LTD., Atlas Court, St. Helens, Lancs.

FOR SALE.—One Fordath Core Sand Mixer.
One Herbert Morris Wheelbarrow.
One Polygram Shell Moulding Pre-closing Heater Oven.
One Lincoln Arc Welding Set.
Telephone Bradford 71161. BRASSFOUNDERS (BFD.) LTD.

FOR SALE.—Two 400-lb. Morgan Oil Fired Bale-out Furnaces, approximately 2½ years old. Two 400-lb. Electrogenerator Oil Fired Bale-out Furnaces, approximately 1 year old. Spare Sets of Brick Linings also available. These furnaces may be seen in operation at our works. W. H. ROWE & SON, LTD., Quayside Road, Bitterne Manor, Southampton.

TWW

BM2 Sand Mill by Foundry Equipment, cap. 4 tons per hour, electrics 365/3/50 cycles.
New Guyson Shot Blast Cabinet, 42 in. × 30 in. × 36 in. Complete with Dust Collector and Extraction Unit. 400/440/3/50 supply electrics.
Wallwork WT563C Shockless Jolt Squeeze Straight Draw Moulding Machine.
BMM Type RD2 Turnover Jolt Squeeze Moulding Machine, table 36 in. × 25 in.
BMM Type BT5 Jolt Squeeze Turnover Moulding Machine, table 35 in. × 28 in.
Coleman Wallwork Type WT562C Shockless Jolt Squeeze Turnover Moulding Machine, table 35 in. × 24 in.
Climan 80E Stationary Air Compressor, 320 c.f.m., 100 lb. p.s.i. with 90 h.p. Brook Motor and Starter.
Hexagon Steel Rumbler, 48 in × 30 in. across flats, Reduction Gear drive and motor.
Shot Blast Plant, Rumbling Barrels, Furnaces, Air Compressor, available from stock.

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ALBION WORKS : SHEFFIELD
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PNEULEC 6 ft. dia. with Bucket Elevator, Disintegrator, Skip Loader, 3/50/400 V.
DEVEY 3 ft. 6 in. and 5 ft. 0 in. overdriven, 4 ft. 0 in. underdriven.
LABORATORY Pan Mill, 17 in. dia. m/d.
DISINTEGRATOR double-cage type, m/d.
PNEULEC ROYERS, sizes No. 1 and 2.

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"Acme" coke-fired.
Fordath gas-fired "Senior" stationary type.

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Goodyear 10 ft. × 6 ft. × 6 ft. high.
Griffiths approx. 6 ft. 10 in. × 3 ft. 10 in. × 5 ft. 2 in. high, and 5 ft. × 6 ft. × 6 ft.
All double cased, gas-fired.
Blowing and Exhausting Fans of all sizes belt and motor-driven.
AIR COMPRESSORS; AIR RECEIVERS
Send your enquires to:—

S. C. BILSBY & CO.,
Tipton 2448
31, Hainge Road, Tividale, Staffs.

FOR SALE

VITREOUS ENAMELLING PLANT, by Metalectric of Smethwick, including 2 in. "Metalectric" Furnaces 250-kW. rating, 12 ft. × 4 ft. 6 in. × 2 ft. 6in., Steam Heated Drying Oven, 40 ft. × 9 ft. (internal), Gutmann Shotblast Plant, and all auxiliary equipment, Vats, Spray Booths, Conveyors, etc. All electrics 400-440 v./3/50 A.C.
For further details apply:

SUFFOLK IRON FOUNDRY (1920) LTD.
Stowmarket, Suffolk.

TWW

SECONDHAND (appears unused) "SAGAR" 8½ in. centres Wood Turning Lathe, pattern maker's type with travelling saddle, 4 speeds, motorised 3 phase, and with extra equipment.

THOS. W. WARD LTD.
BRETTENHAM HOUSE,
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'Phone TEMple Bar 1515 (12 lines.)

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FOR SALE.—CAST IRON PATTERN PLATES, and Cast Iron Coreboxes supreme for mechanical moulding and coreblowing. ROBERT R. SHAW, Patternmaker, Falkirk Road, Larbert, Stirlingshire. Phone 300.

PAN MILLS, 4 ft. and 5 ft. dia. underdriven, stationary pans, self-discharging, new, for delivery from stock. W. & A. E. BREALEY (MACHINERY) LTD., Misterton, nr. Doncaster. Tel. Misterton 202.

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For good prices and prompt settlement sell to actual users.

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MATERIALS FOR SALE—*contd.*

CRISTOBALITE. White; highest purity; fine powders. For "lost wax" mouldings, etc. HENSHAW & Co., 97 Clearmount Road. Weymouth 448.

FIREWOOD for Cupolas, Sleepers and Sleeper Wood in wagon loads.—TRACK SUPPLIES & SERVICES LTD., Haversham Bank Sidings, Wolverton, Bucks.

HORSE MANURE for Foundry use. Consistent high quality at competitive terms. Testimonials available. Delivery from unlimited stocks. GINISTER BROS., Walsall, 27367.

PATENTS

THE proprietor of British Patent No. 738943, entitled "A Water Wall Tile Structure," offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, STERN & CARLBERG, 140 So. Dearborn St., Chicago 3, Illinois, U.S.A.

THE Proprietors of Patent No. 682316 for "Process for Producing Cast Iron," desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to HASELTINE LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

BUSINESS OPPORTUNITIES

ENGINEER, qualified, and with wide foundry experience, wishes to purchase interest in active foundry or engineering business. Substantial capital available. Reply: BOX EQ614, FOUNDRY TRADE JOURNAL.

PROPERTY FOR SALE

FOR SALE as going concern, small Jobbing Foundry. Capacity for 25 tons weekly. Freehold property. Industrial zoned. Dudley area. Total area 18,000 sq. ft. Covered area 12,000 sq. ft. Apply Box FS603, FOUNDRY TRADE JOURNAL.

CAPACITY AVAILABLE

CAPACITY available in Grey Iron Foundry for castings up to 10 cwt. Good quality and delivery. ARNALL CAPPS, LTD., Thurton, Norfolk.

CAPACITY available for Iron and Steel Castings. Sand and Shell Moulding. pattern making capacity. Enquiries invited: KNEYS CASTINGS, LTD., Station Road, West Horndon, Essex.

CAPACITY AVAILABLE—*contd.*

VITREOUS ENAMELLING.—Capacity available for enamelling castings in all finishes (plain, mottle, marble, lustre, etc.). Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley, Yorks. Tel.: Keighley 3737.

HEAT TREATMENT of Iron and Steel. Annealing, Normalising, Stress Relieving and Shotblasting. Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley. Tel. Keighley 3737.

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PATTERNS for all branches of Engineering for Hand and Machine Moulding.—FURNESS & LAWLOR, LTD., Letchworth.

FOR successful castings from your plant. Pressurecast matchplates, precision wood or metal pattern equipment can be purchased quickly, competitively, from BOOTH BROS. ENGINEERING, Baggrave Street, Leicester. Tel. 67020.

HENRY CLUETT & CO., LTD.—Patterns of all types in Wood, Metal and Epoxy Resin. Quotations by return. Quick delivery. Furlong Road, Tunstall, Stoke-on-Trent. Tel. 87822.

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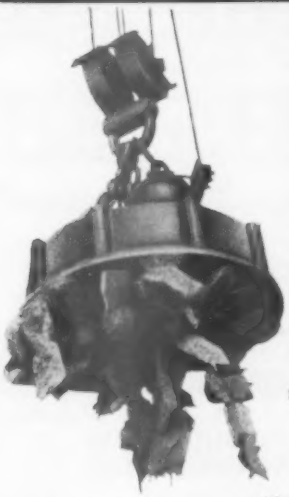

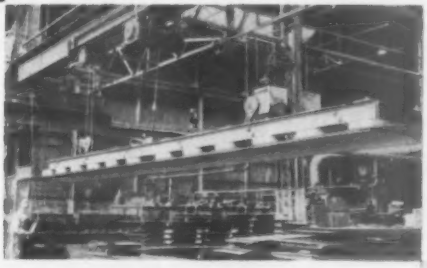

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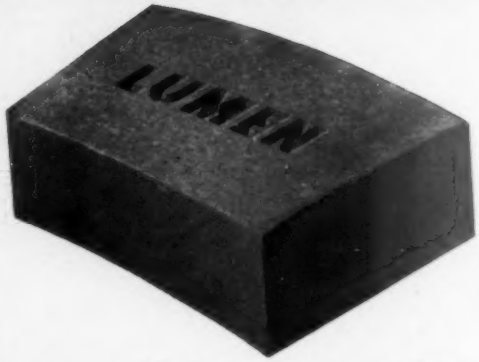

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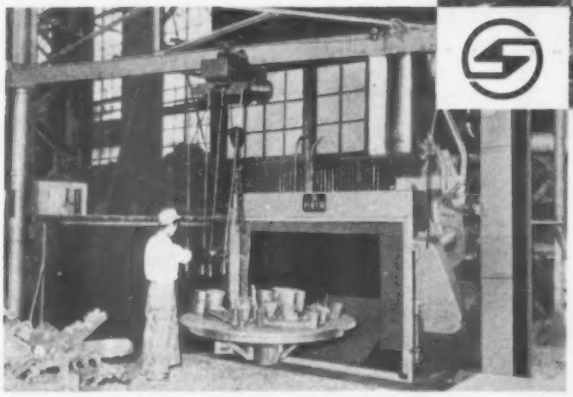

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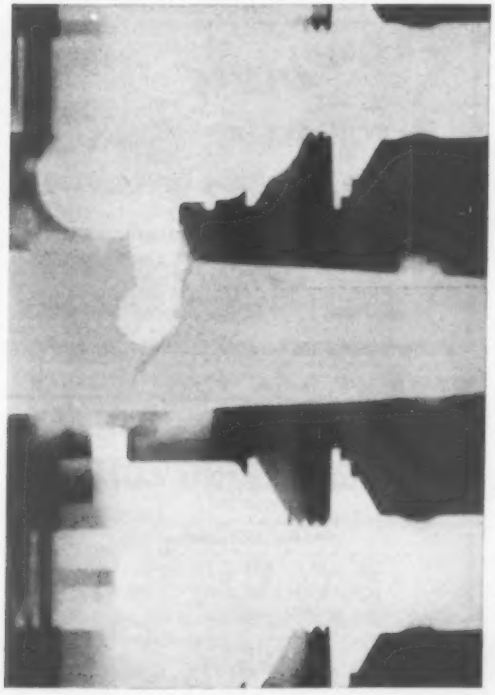

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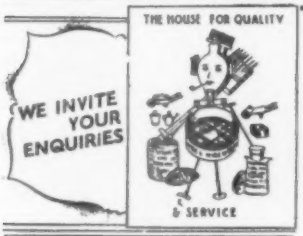

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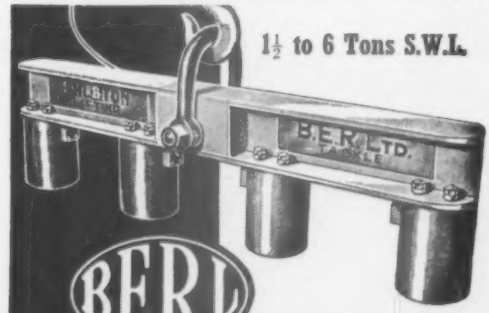

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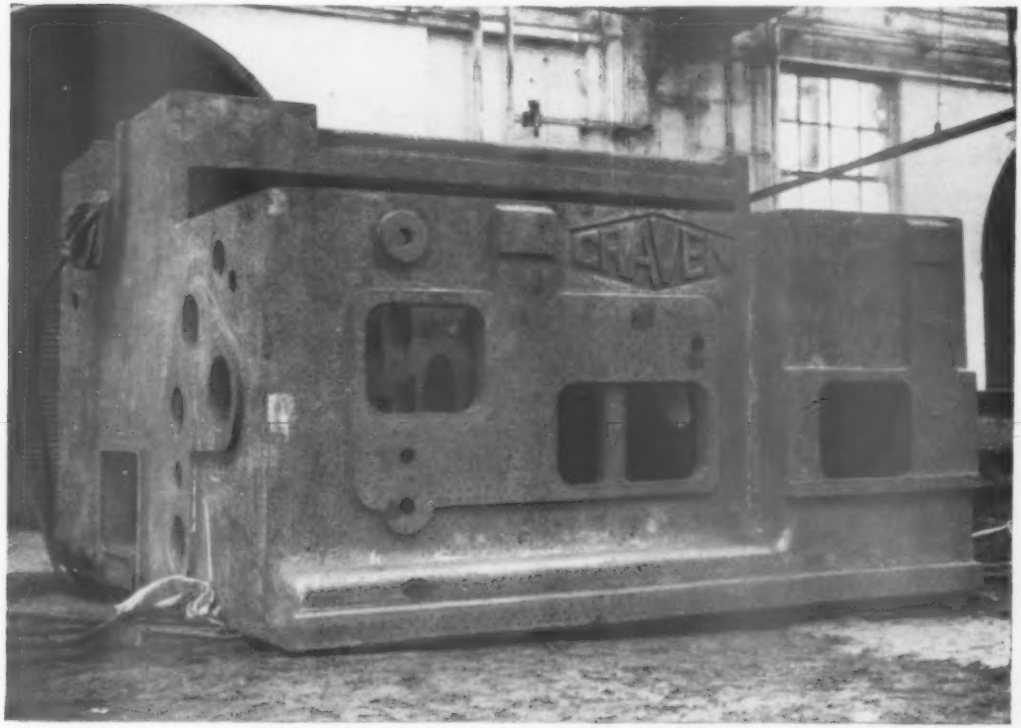

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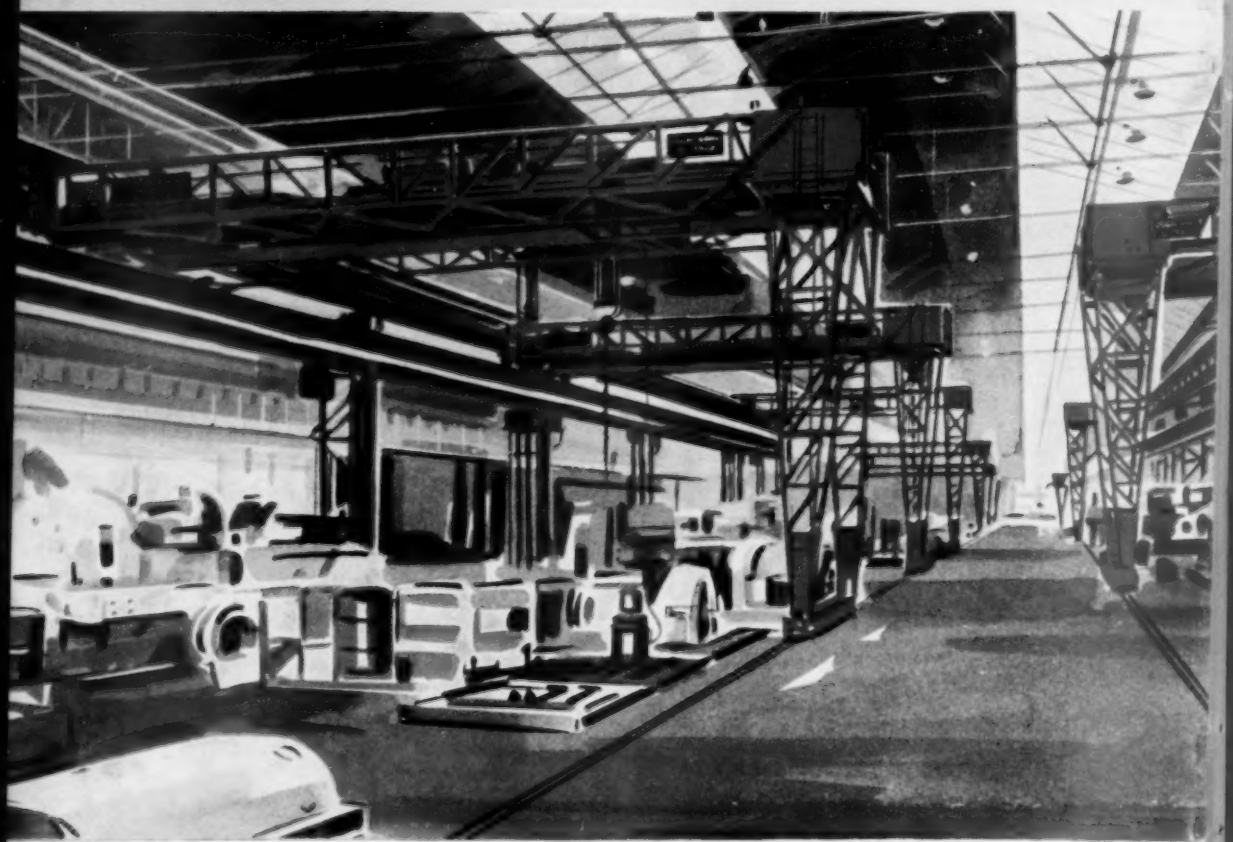

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